<Seventh Press Conference for Overseas Media>
Update on the Status of the Discharge of ALPS Treated Water into the Sea and Decommissioning Work at the Fukushima Daiichi Nuclear Power Station

TEPCO

November 21, 2024

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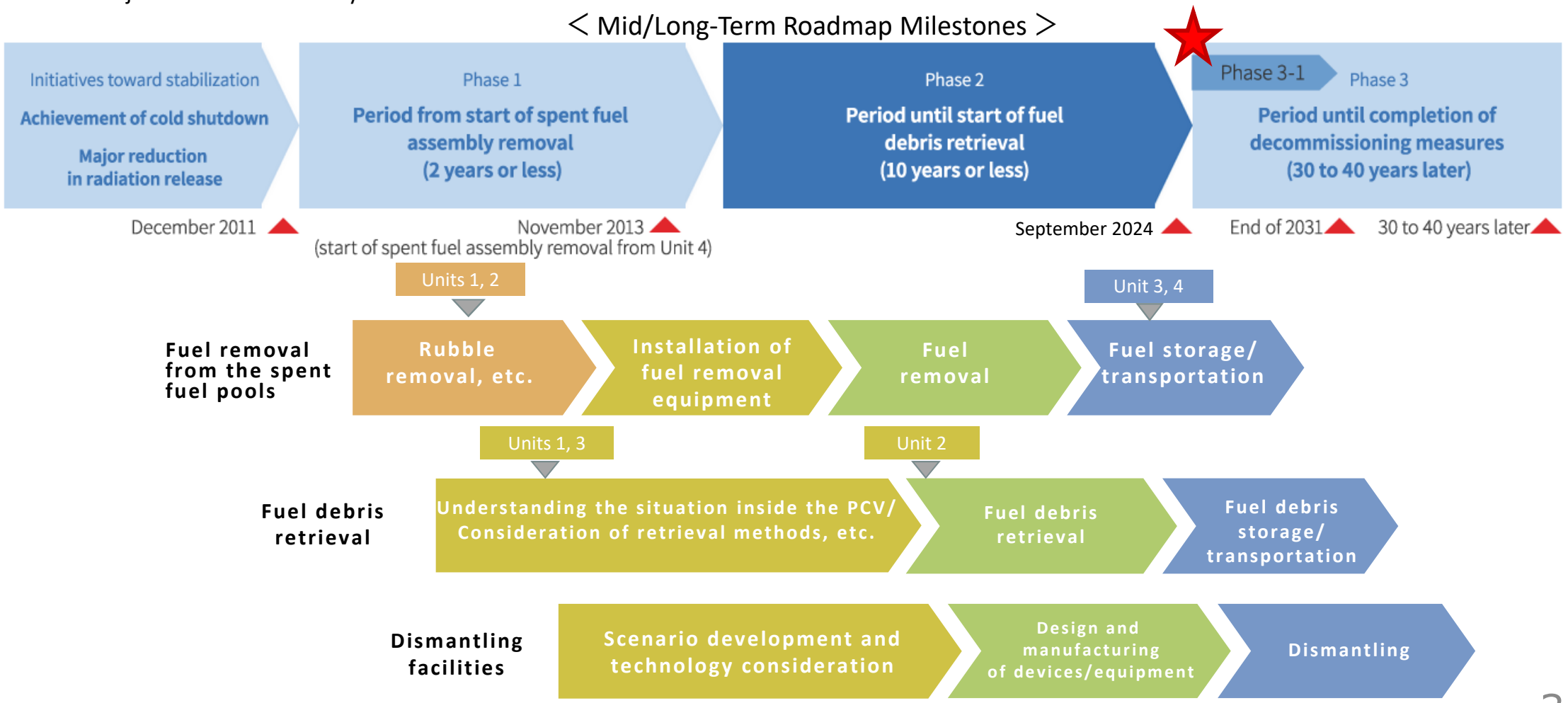
Today’s agenda

- Overview of the Decommissioning Work
- Fuel Debris Trial Retrieval from Unit 2
- Status of the Discharge of ALPS Treated Water
- Q&A Session

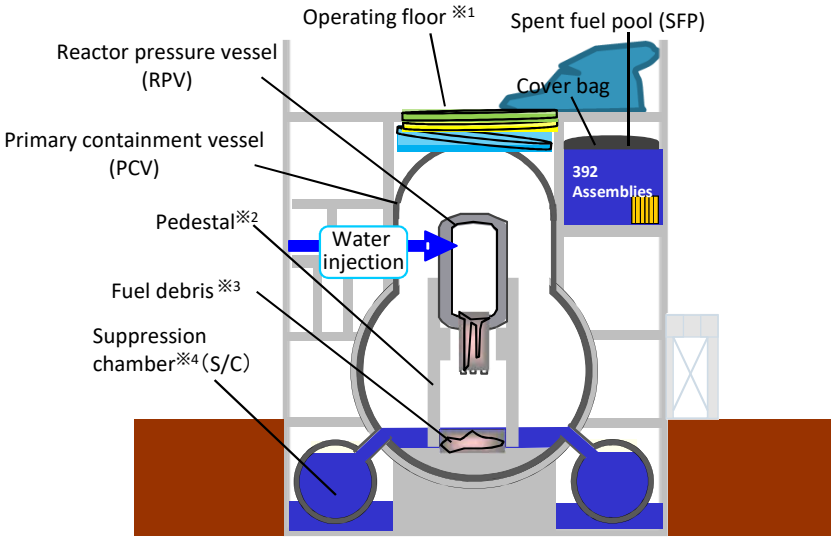
Overview of the Decommissioning Work

Primary decommissioning objectives and work steps

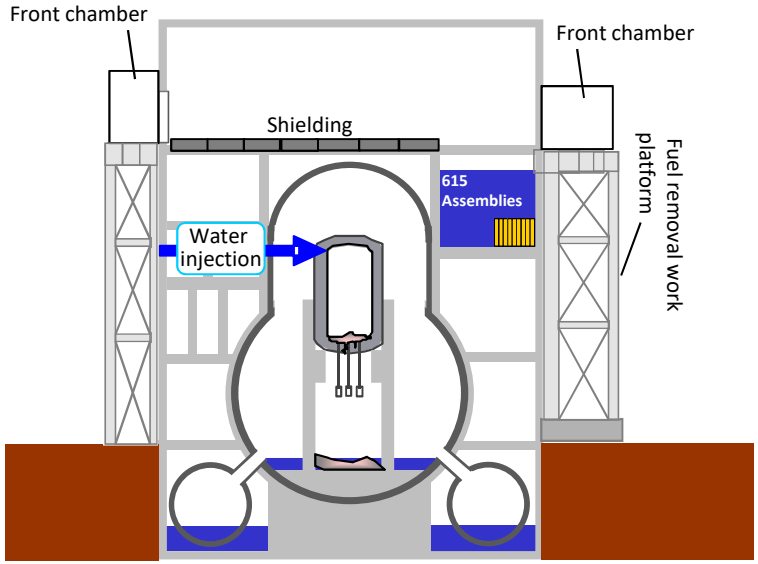
- At the Fukushima Daiichi Nuclear Power Station we continue to engage in tasks that aim to stabilize and manage risks stemming from radioactive substances released during the accident.
- The removal of fuel from the Unit 4 and Unit 3 spent fuel pools was completed on December 22, 2014 and February 28, 2021, respectively. We continue to make preparations at Units 1 and 2 for spent fuel removal. (We aim to have completed fuel removal at all units (Units 1~6) by the end of 2031).
- On September 10, 2024, we commenced the trial retrieval of fuel debris from Unit 2 using a telescopic device as part of preparations to retrieve fuel debris from Units 1~3.【Marks a transition to Phase 3 of the Mid/Long-Term Roadmap】. Furthermore, the fuel debris sampled from Unit 2 on November 7 of the same year was transported to an off-site analysis facility on November 12 of the same year and is currently being subjected to detailed analysis.



Current conditions at Units 1 and 2



Unit 1



Unit 2

In preparation for the removal of fuel from the spent fuel pool, construction of a large cover began in September 2021 (To be completed around the summer of 2025).

Internal investigations of the primary containment vessel are being conducted in preparation for fuel debris retrieval.

A fuel removal work platform and a front chamber is being constructed on the south side of the reactor building in preparation for the removal of fuel from the spent fuel pool.

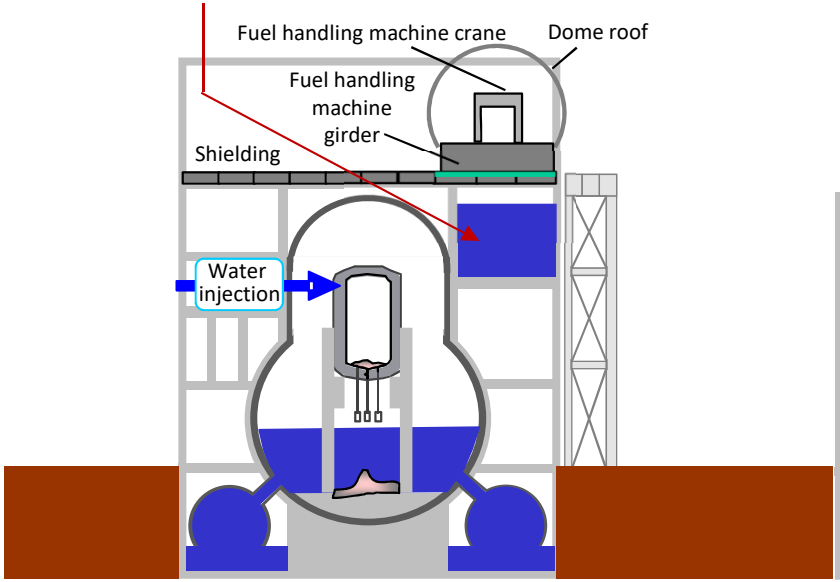
This is the first unit from which fuel debris has been retrieved. Retrieval via a telescopic device has been completed (November 7, 2024)

※1 Uppermost floor of the reactor building
※2 During the accident fuel in the core inside the reactor pressure vessel melted with structures inside the primary containment vessel and then solidified. The resulting material is referred to as "fuel debris."
※3 The foundation that supports the reactor. It is a steel plated cylindrical shell that has been filled with concrete.
※4 A part of the primary containment vessel that holds water.

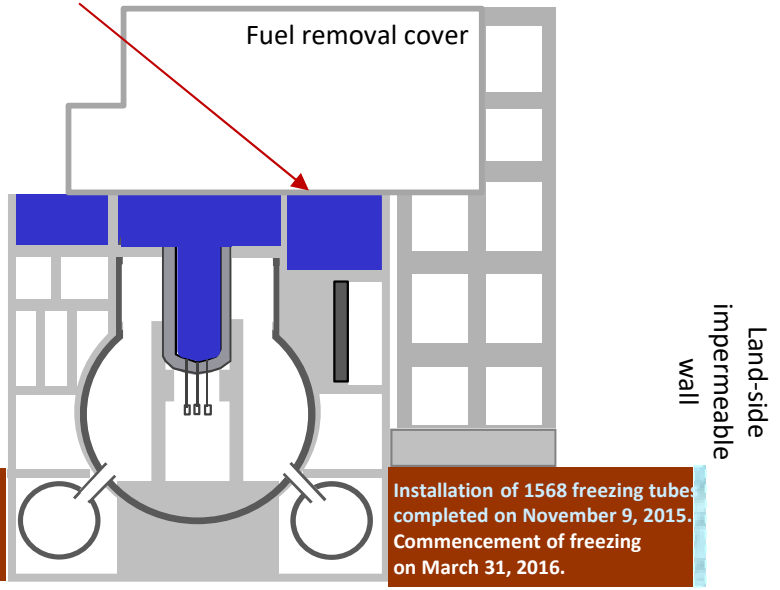
Current conditions at Units 3 and 4

Fuel removal completed: February 28, 2021 (566 assemblies)

Fuel removal completed: December 22, 2014 (1,535 assemblies)



Unit 3



Unit 4

Removal of the fuel from the spent fuel pool (566 assemblies) was completed on February 28, 2021.

The need for additional internal investigations of the primary containment vessel in preparation for the retrieval of fuel debris is being deliberated.

The removal of fuel from the spent fuel pool (1535 assemblies) was completed on December 22, 2014 thereby eliminating risks associated with fuel.

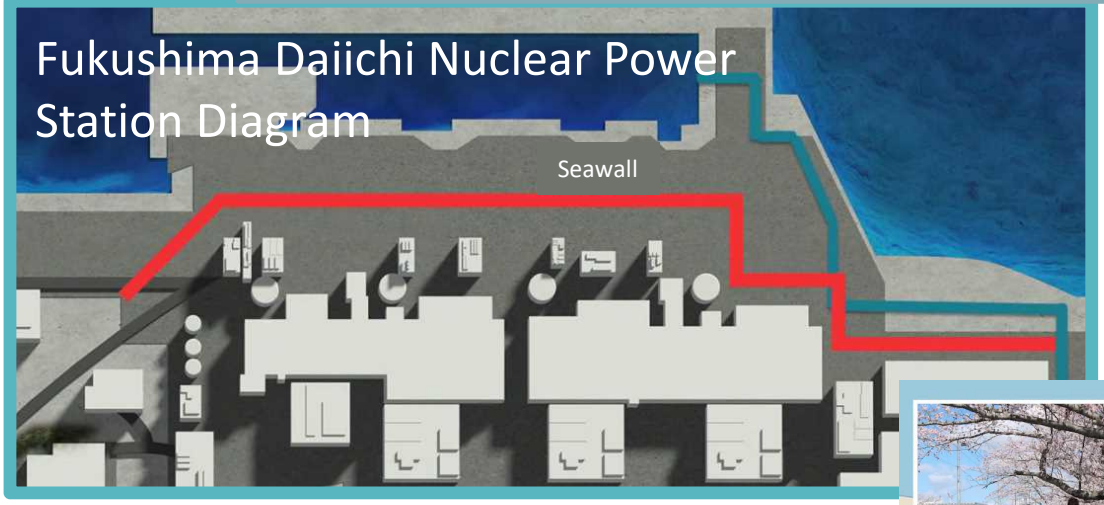
Current conditions at the Fukushima Daiichi Nuclear Power Station

- On the sea-side of the station, where there was much damage, rubble has been removed.
- As a result of countermeasures, such as paving ground surfaces, etc., general work uniforms can be worn in 96% of the site.
- Seawall which serves as a tsunami countermeasure was constructed.

Sea-side area following the accident

Kuril Trench tsunami countermeasure seawall completed in September 2020

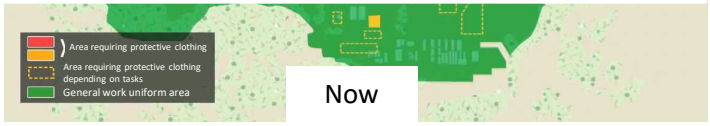
Construction of the Japan Trench tsunami countermeasure seawall completed on March 2024



Unit 3 building cover

Paving of site surfaces

General work uniforms can be worn in 96% of the site



Fuel Debris Trial Retrieval from Unit 2

Primary plans for reducing risks at Unit 2

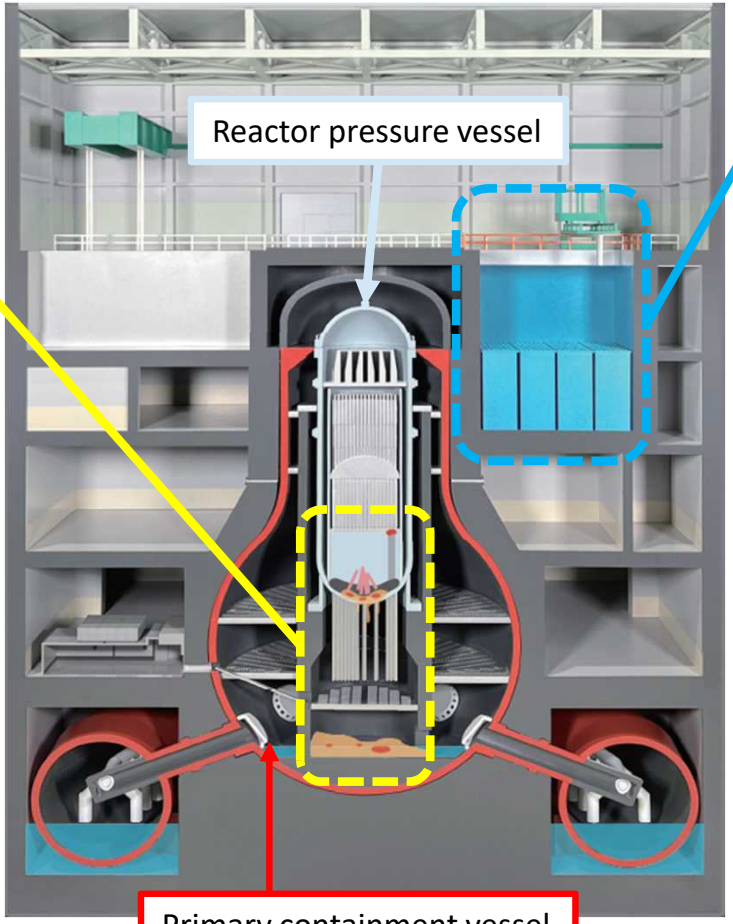
- There are two major risks within the Fukushima Daiichi Nuclear Power Station reactor buildings. These are "spent fuel" and "fuel debris“, which is fuel that melted, fell, and then solidified during the accident in Unit 1-3.
- Through decommissioning, we will reduce risks stemming from these radioactive substances through the stable management and suitable storage at an on-site location that is strictly managed.

Fuel debris


Photo taken during 2019 internal investigation

Fuel debris will be retrieved, put into a safe container, and kept stable at an on-site location that is strictly managed.

Safety will be prioritized when engaging in tasks in high-dose environments using remotely operated equipment.

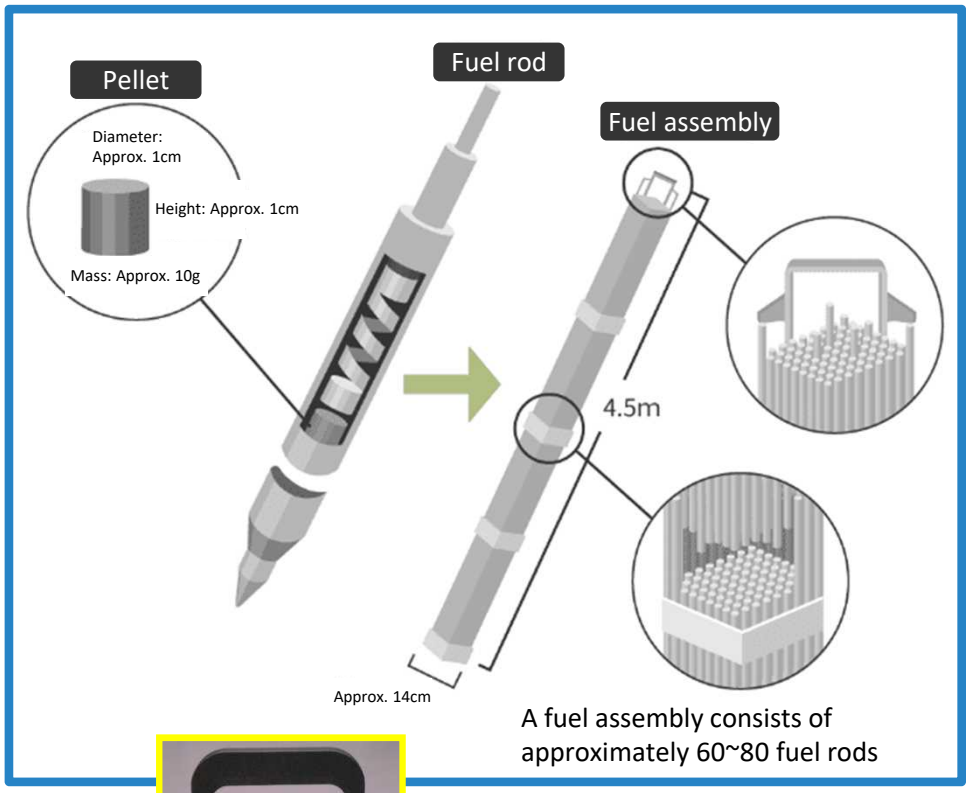


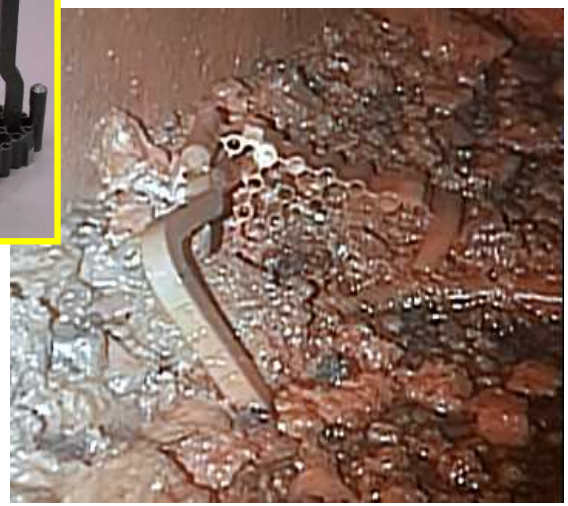
Spent fuel

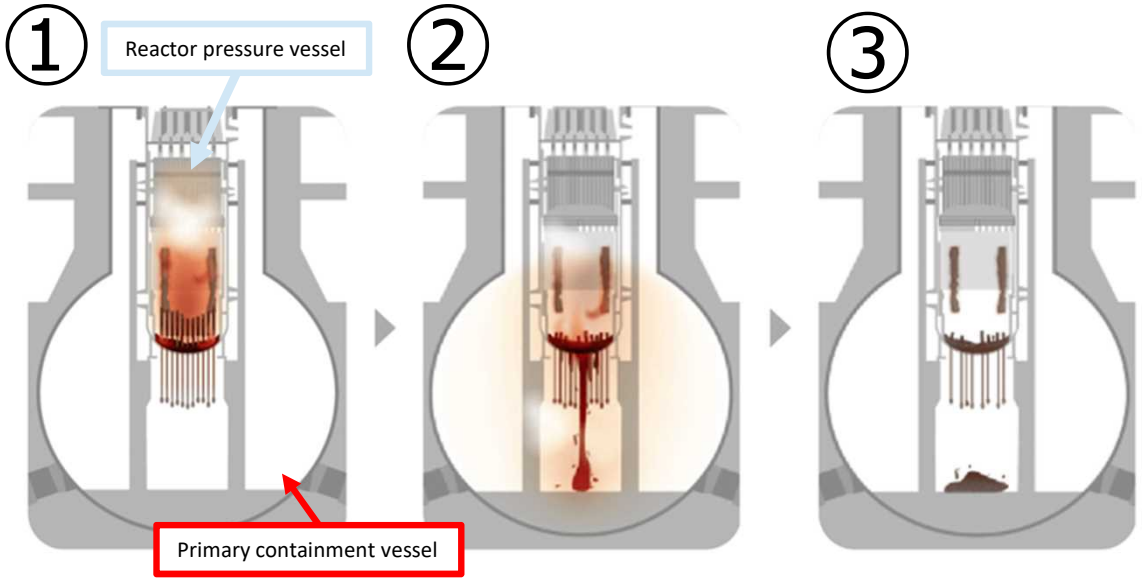
Fuel in the pools is relocated to a common pool on site where it is appropriately stored and kept stable.

● Work commencement schedule
Unit 1: FY2027~FY2028
Unit 2: FY2024~FY2026
＜Reference＞
Unit 3, Unit 4: Removal completed

How fuel debris formed







① The fuel could not be cooled and the pellets melted (Melting point: Approximately 2800°C)

② The fuel melted into fuel rod cladding material and fuel assembly structures, and some of it fell to the bottom of the pedestal

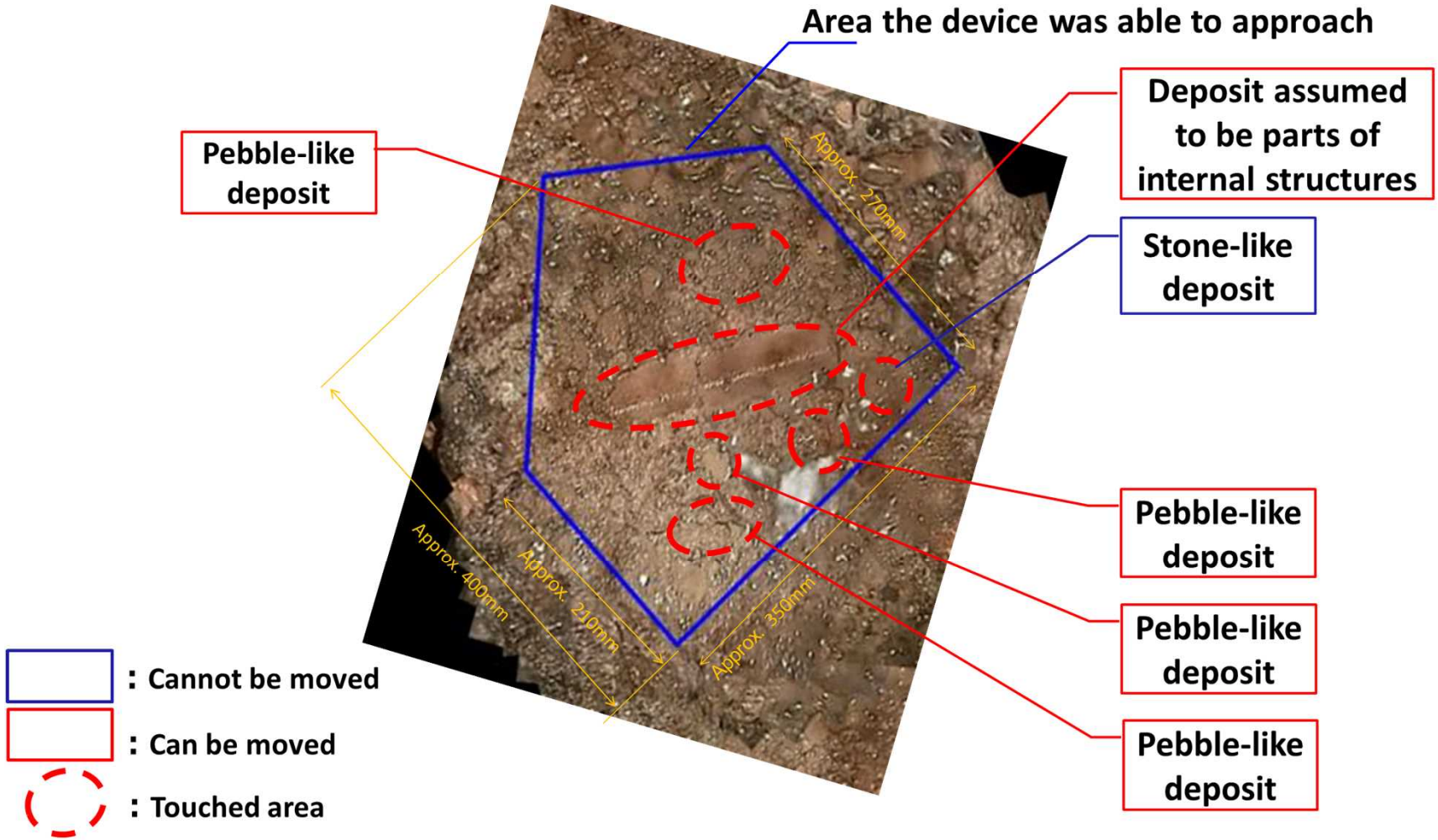
③ As this melted material fell, it cooled and solidified thereby forming **the various multi-composition fuel debris that now exists inside the primary containment vessels**

※Temperatures inside the primary content vessels are currently being maintained at between approximately 20~35°C

Fuel assembly structures melted along with the fuel and then solidified resulting in fuel debris
(photographed during 2018 internal investigation)

What we've learned from internal investigations to date

- During a primary containment vessel internal contact investigation of Unit 2 in 2019 we touched fuel debris at the bottom of the pedestal
- We confirmed that pebble-like and structure-like deposits can be grasped and moved. We also confirmed that it is possible that there are hard rock-like deposits that cannot be grasped.



Shape and size of the fuel debris that will be sampled during trial retrieval

- Fuel debris retrieval begins on a small scale, and will take into account new knowledge gained from the situation inside the reactor containment vessels and work experiences.
- The scale of retrieval will be enlarged step by step while reviewing the work flexibly.

- ✓ Trial retrieval begins from Unit 2, where internal investigations have made the most progress
- ✓ We plan to sample pebble-like fuel debris that we confirmed can be moved during the contact investigation performed at the bottom of the pedestal in 2019
- ✓ We plan to sample fuel debris that is approximately 5mm in diameter ※

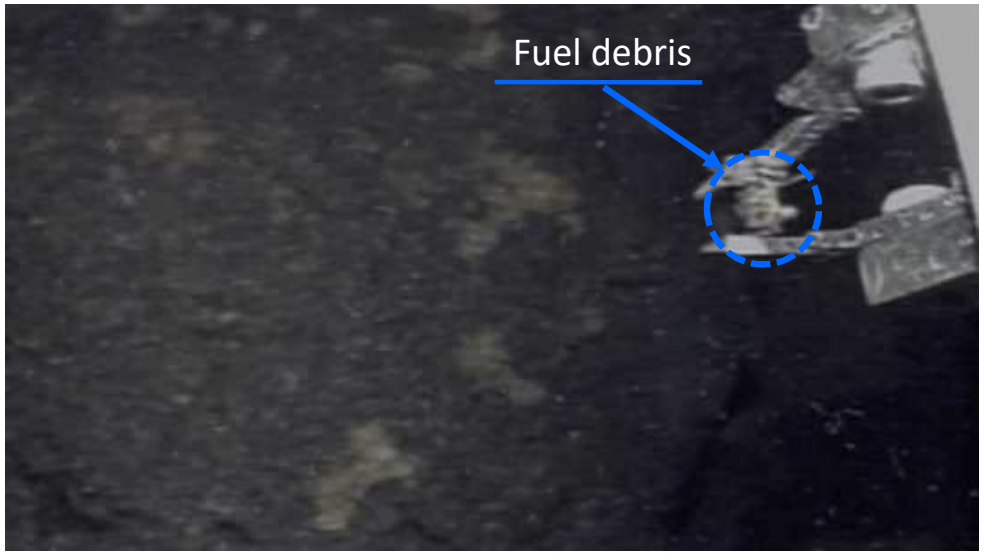
※

- We have confirmed that if the fuel debris to be sampled was composed of only fuel, a sample of less than 3g would not exceed the planned dose limit of 24mSv/hour, which would not hinder the safety of trial retrieval work. A ball-like fuel debris with a diameter of 8mm would result in a mass of less than 3g, therefore we will sample fuel debris with a diameter of approximately 5mm to be conservative.

Fuel debris trial retrieval from Unit 2 has been completed

- In September 2024, the trial retrieval of fuel debris was started.
- On October 30 2024, the end jig of the telescopic device was lowered to perform a fuel debris grasping work at the bottom of the pedestal.
- The fuel debris was grasped by the gripper of the end jig, and the first fuel debris was retrieved since the accident. Approximately 5 mm in size and weighing approximately 0.7 g.
- The fuel debris retrieved was stored in a transportation container on November 7, completing the trial removal work.
- No significant changes were observed in the surrounding dust monitors or the monitoring posts at the site boundary, and the work was completed safely.
- The cause of the camera malfunction that occurred during the work will be investigated.

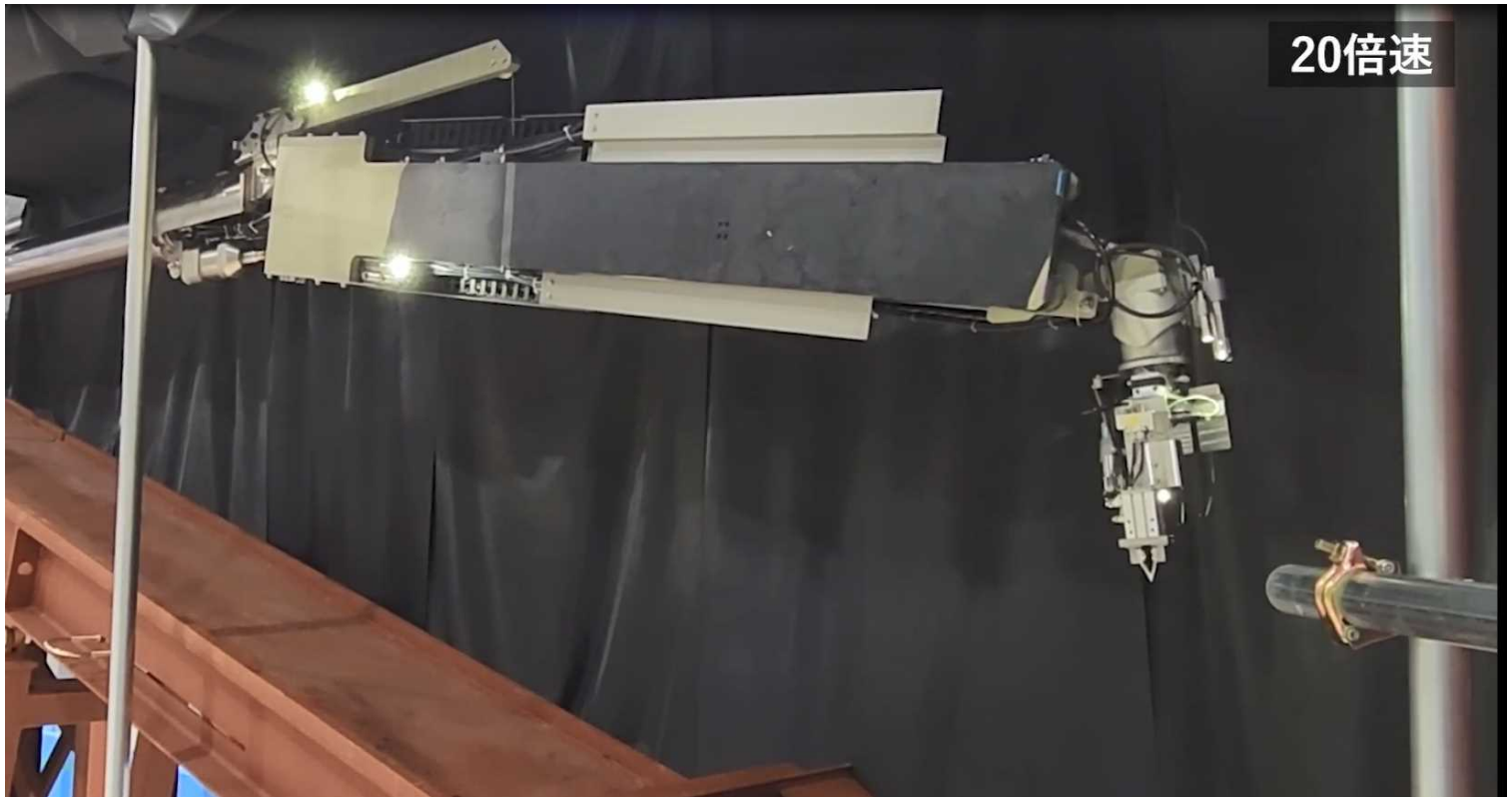
At the remote operations room



End jig grasping fuel debris

Photographed on October 30, 2024

Sampling fuel debris with a telescopic trial retrieval device ①

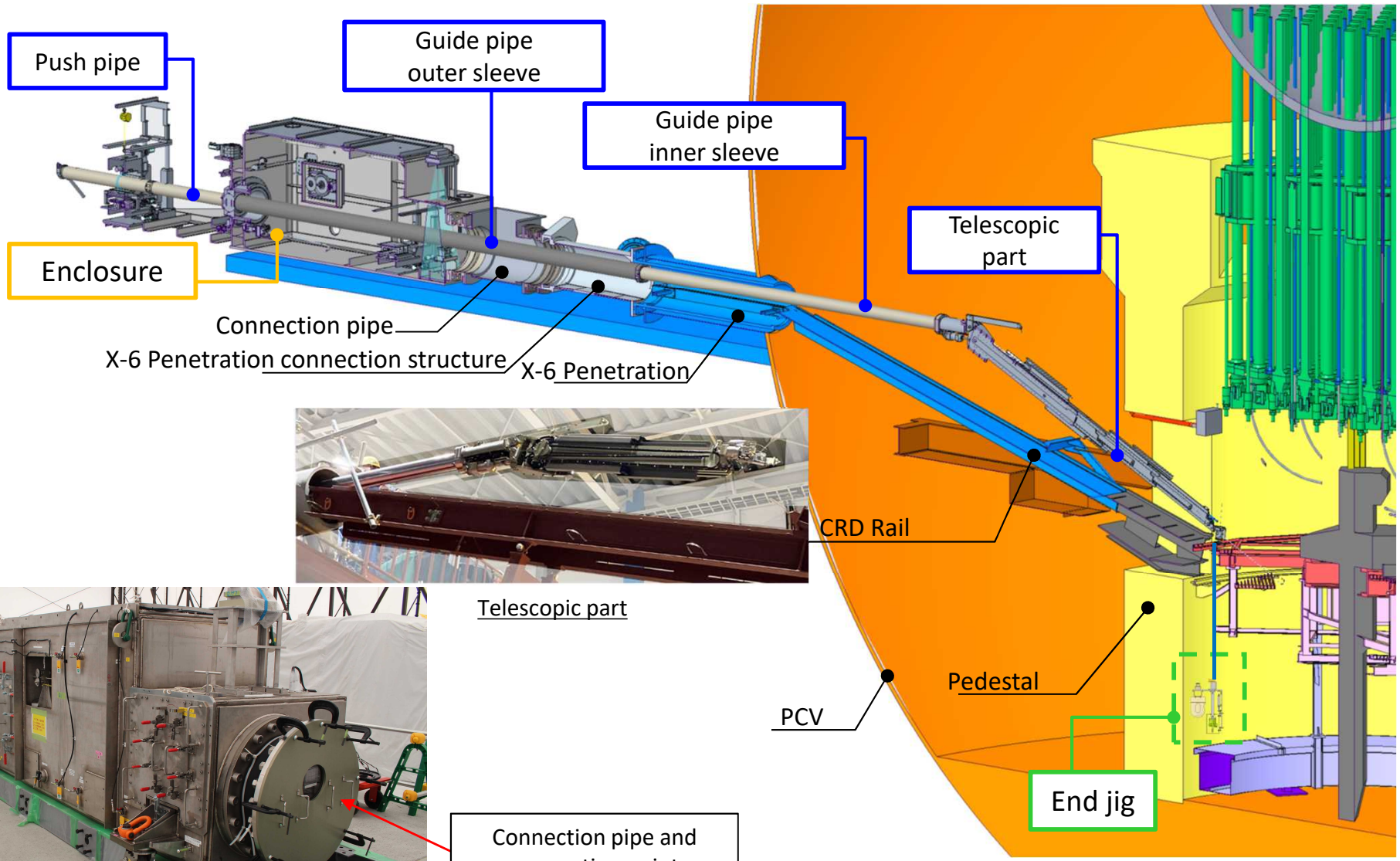


＜Video introducing the telescopic device＞

＜TEPCO　FUEL DEBRIS PORTAL SITE＞

Sampling fuel debris with a telescopic trial retrieval device ②

- The telescopic device will be used for the trial retrieval of fuel debris by accessing the inside of the PCV from the X-6 penetration.
- Since it will be connected to the connection pipe, the enclosure will serve as a PCV boundary during the trial retrieval of fuel debris.



Telescopic part

Telescopic device

Grasping fuel debris

＜Video showing how fuel debris was grasped＞

＜TEPCO　FUEL DEBRIS PORTAL SITE＞

Transportation of the sampled fuel debris to an off-site analysis facility was completed safely

- The fuel debris sampled from Unit 2 was transported to the Japan Atomic Energy Agency (JAEA) Oarai Nuclear Engineering Institute in order to be analyzed. (November 12, 2024)
- Before the fuel debris was transported to an off-site analysis facility, a spectrum analysis was carried out at the Fukushima Daiichi Nuclear Power Station, and a peak estimated to be europium 154 was detected, confirming the possibility that the material contained components derived from the fuel.

Off-site transportation container loaded onto an off-site transfer vehicle

Final check of the off-site transfer vehicle prior to departure from Fukushima Daiichi

Photographed on November 12, 2024

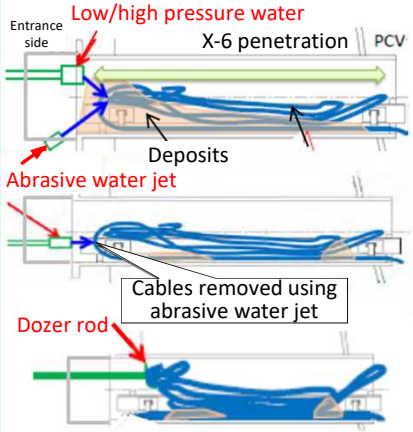
Primary steps of upcoming fuel debris trial retrieval

1. Isolation chamber installation

2. Opening of the X-6 penetration hatch

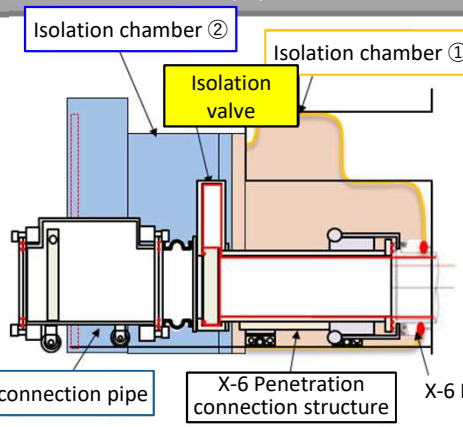
3. Removal of deposits from inside the X-6 penetration

Removing deposits/cables from inside the X-6 penetration



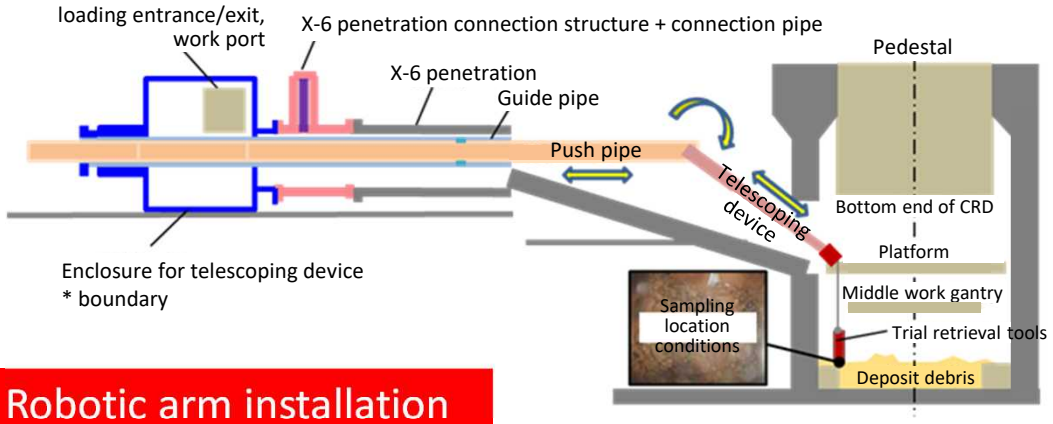
- Deposits pushed with low/high-pressure water
- Cables removed with Abrasive water jet
- Cables pushed with dozer rod

4. Installation of X-6 penetration connection structure and connection pipe

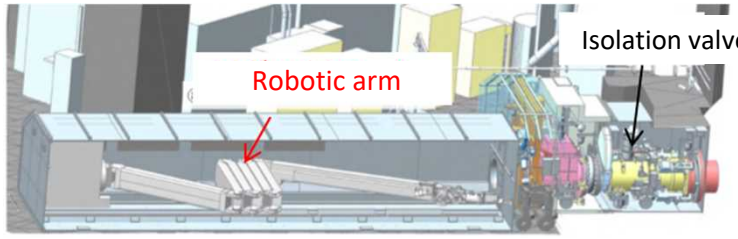


The connecting structure and connection pipe will be installed at the X-6 penetration and the boundary will be changed from the isolation chamber to the connection structure.

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

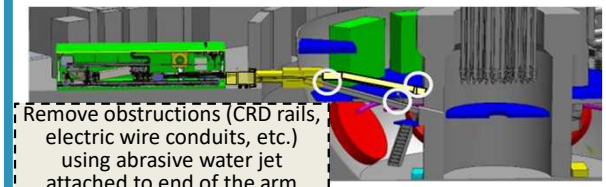


7. Robotic arm installation

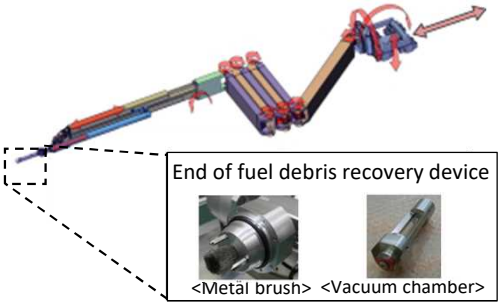


8. Internal investigation/debris sampling using robotic arm

① Internal investigation



② debris sampling using robotic arm



(Note)

Isolation valve: Valve installed to separate the inside of the PCV from the outside

Abrasive Water Jet: Combines high pressure water with an abrasive to improve cutting ability

ALPS Treated Water Discharge Status Update

TEPCO

Discharge history and future plan

- The following chart shows the history and future plan of the discharge of ALPS treated water into the sea. The 24-6-10 discharge was safely completed as planned on November 4 and the 24-7-11 discharge will be commenced in February to March 2025.

FY2023

Management number	Tank group	Tritium concentration	Commenced	Completed	Amount of discharge	Amount of tritium radioactivity
23-1-1	Group B	14 x 10^4 Bq/liter	Aug 24, 2023	Sep 11, 2023	7,788m^3	Approx. 1.1 trillion Bq
23-2-2	Group C	14 x 10^4 Bq/liter	Oct 5, 2023	Oct 23, 2023	7,810m^3	Approx. 1.1 trillion Bq
23-3-3	Group A	13 x 10^4 Bq/liter	Nov 2, 2023	Nov 20, 2023	7,753m^3	Approx. 1.0 trillion Bq
23-4-4	Group B	17 x 10^4 Bq/liter	Feb 28, 2024	Mar 17, 2024	7,794m^3	Approx. 1.3 trillion Bq

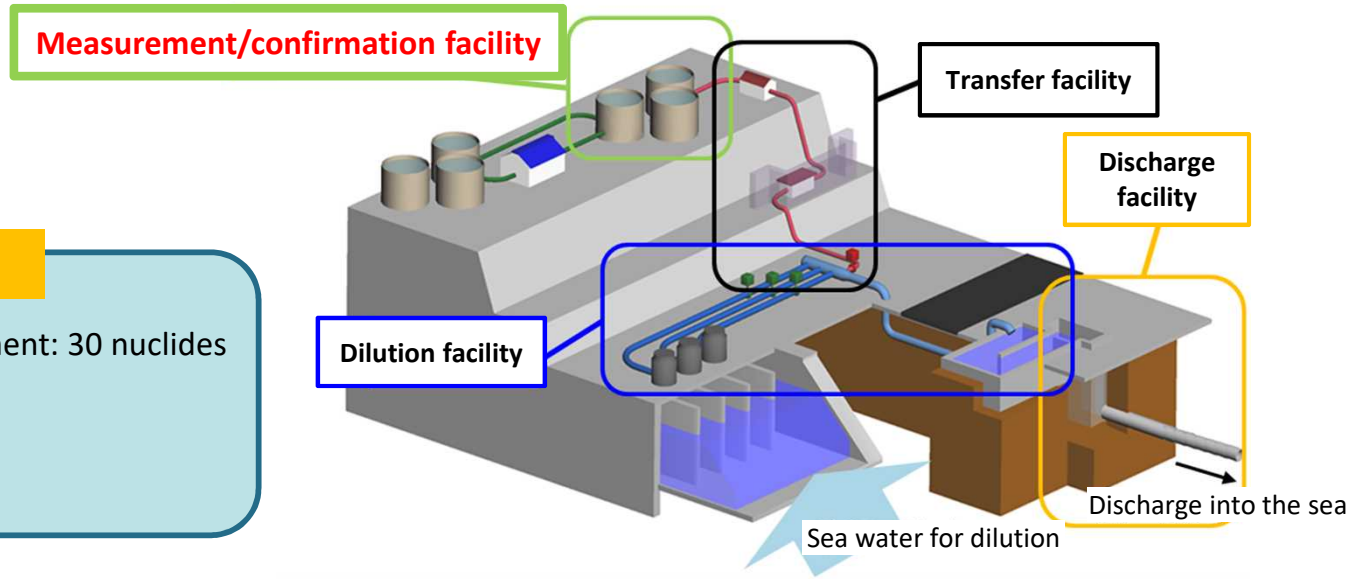
FY2024

Management number	Tank group	Tritium Concentration	Commenced	Completed	Amount of discharge	Amount of tritium radioactivity
24-1-5	Group C	19 x 10^4 Bq/liter	Apr 19, 2024	May 7, 2024	7,851m^3	Approx. 1.5 trillion Bq
24-2-6	Group A	17 x 10^4 Bq/liter	May 17, 2024	Jun 4, 2024	7,892m^3	Approx. 1.3 trillion Bq
24-3-7	Group B	17 x 10^4 Bq/liter	Jun 28, 2024	Jul 16, 2024	7,846m^3	Approx. 1.3 trillion Bq
24-4-8	Group C	20 x 10^4 Bq/liter	Aug 7, 2024	Aug 25, 2024	7,897m^3	Approx. 1.6 trillion Bq
24-5-9	Group A	28 x 10^4 Bq/liter	Sep 26, 2024	Oct 14, 2024	7,800m^3	Approx. 2.2 trillion Bq
24-6-10	Group B	31x 10^4 Bq/liter	Oct 17, 2024	Nov 4, 2024	7,837m^3	Approx. 2.4 trillion Bq
24-7-11	Group C	34~40x 10^4 Bq/liter	Feb~Mar, 2025	Feb~Mar, 2025	7,800m^3	Approx. 3.0 trillion Bq

*Black texts; results, Gray texts; plan

The safety of ALPS-treated water is confirmed prior to discharge

- Regarding the 2-6-10 discharge, samples taken from the measurement/confirmation tank (Group B) confirmed that discharge requirements are being satisfied as well
- The tritium concentration of ALPS-treated water being discharged is 310,000Bq/liter
- The concentrations of the 30 nuclides targeted for measurement also satisfy government regulations



69 nuclides measured

Nuclides targeted for measurement/assessment: 30 nuclides

Nuclides voluntarily measured: 38 nuclides

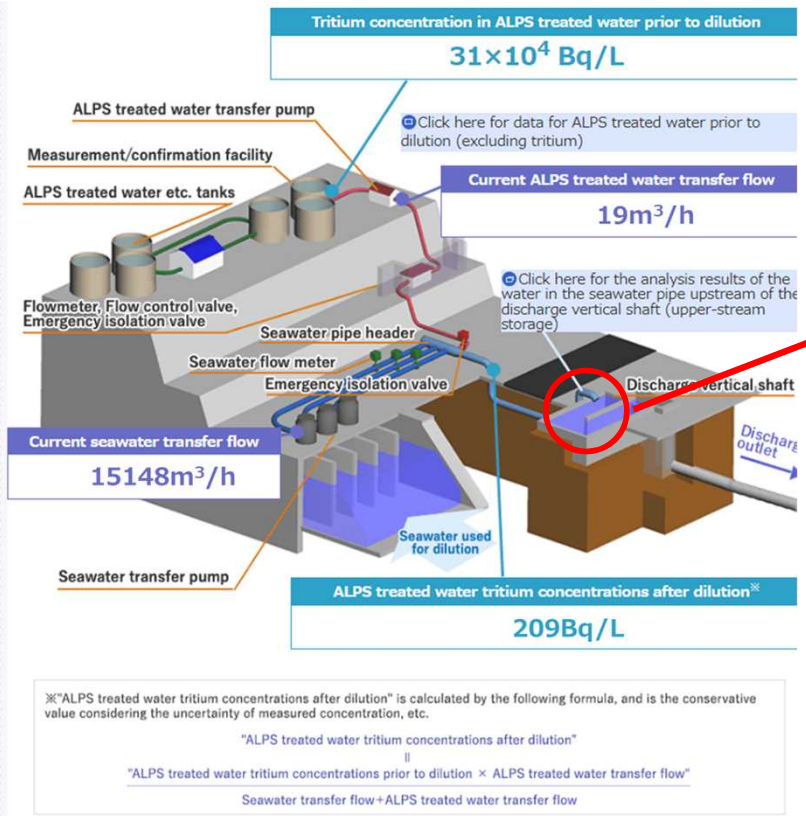
69 nuclides in total when tritium is added

Attributes of ALPS-treated water management number 24-6-10			
Treated water attributes	Concentration of 30 nuclides targeted for measurement/assessment (excluding tritium)	Satisfies government regulations (sum of the ratios of legally required concentrations: Less than 1) (sum of the ratios of legally required concentrations: **0.083**) (Scan the QR code for details, page 1)	Analysis results
	Tritium concentration	**310,000Bq/liter** (Scan the QR code for details, page 2)	
	38 nuclides voluntarily measured to determine if they exist at significant concentrations	**All nuclides were found to not exist at significant concentrations** (Scan the QR code for details, page 3)	
	Water quality tests	Government and prefectural regulations satisfied (Scan the QR code for details, page 4)	

The 24-6-10 discharge was completed on November 4 without any equipment abnormalities

- We have confirmed that the tritium was diluted appropriately during the discharge (less than 1,500Bq/liter)
- Since the commencement of discharge, the amount of ALPS-treated water discharge has remained stable at approximately 460m³/day, and the results concentrations of tritium in seawater on rapid analyses performed by TEPCO every day have shown that discharge was being carried out safely
- Real-time data pertaining to discharge can be found on the Treated Water Portal Site

Treated Water Portal Site
Real-time monitoring data splash page



Management number 24-6-10 discharge data	
Treated water discharge volume	7,837m³
Treated water flow	Approx. 460m³/day
Flow of seawater used for dilution	Approx. 340,000m³/day
Post-dilution tritium concentration	Max: 436Bq/l
Discharge period	17 days

Sea area monitoring is performed

- Since April 2022, we increased the number of sampling locations, subjects and frequency, and set detection limits so that they match the government's target values.
- An indicator for determining discharge suspension (discharge suspension level) and an indicator for determining if any issues need to be addressed at any time before this suspension level has been reached (investigation level) were set for the concentration of tritium in seawater

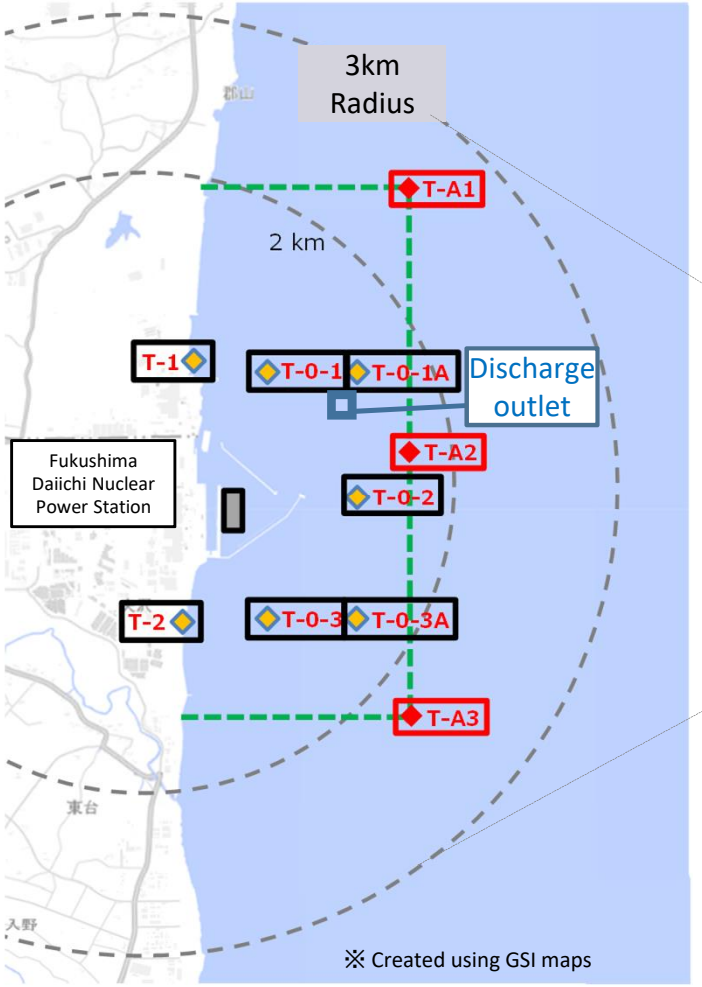


Figure 1.
Power station vicinity (within a 3km radius outside the port)

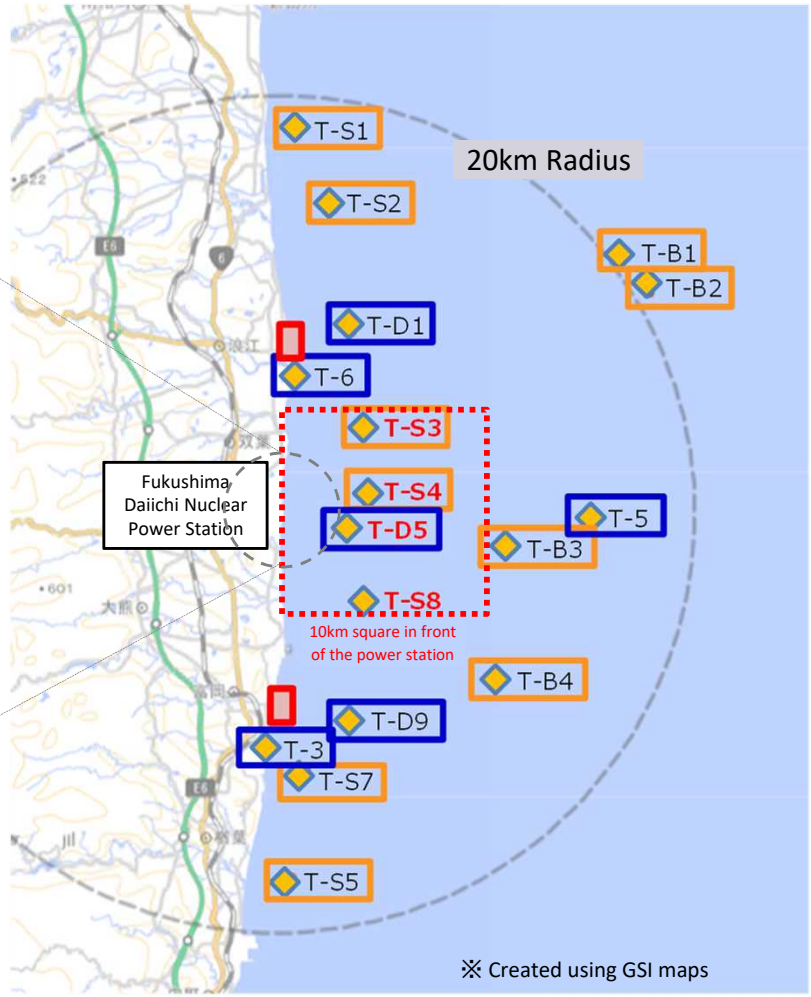


Figure 2.
Within a 20km of the shoreline

【Sampling points enhanced since FY2022】

: Locations where the detection limit was lowered (seawater)
: Locations were sampling was added (seawater)
: Locations where frequency was increased (seawater)
: Locations where tritium measurement was added in addition to cesium measurement (seawater, fish)
: No changes (seaweed)
: Locations where sampling was added (seaweed*1)
: Area where fishing is not conducted on a daily basis*2
E-W1.5km N-S3.5km

*1 : Sampling locations were selected depending on growth conditions
*2 : Area for which no common commercial fishing rights exist

※The symbols and locations of T-A1, T-A2 and T-A3 in Figure 1 have been corrected so that they match the Comprehensive Monitoring Plan rather than the Sea area monitoring plan publicly disclosed on March 24, 2022

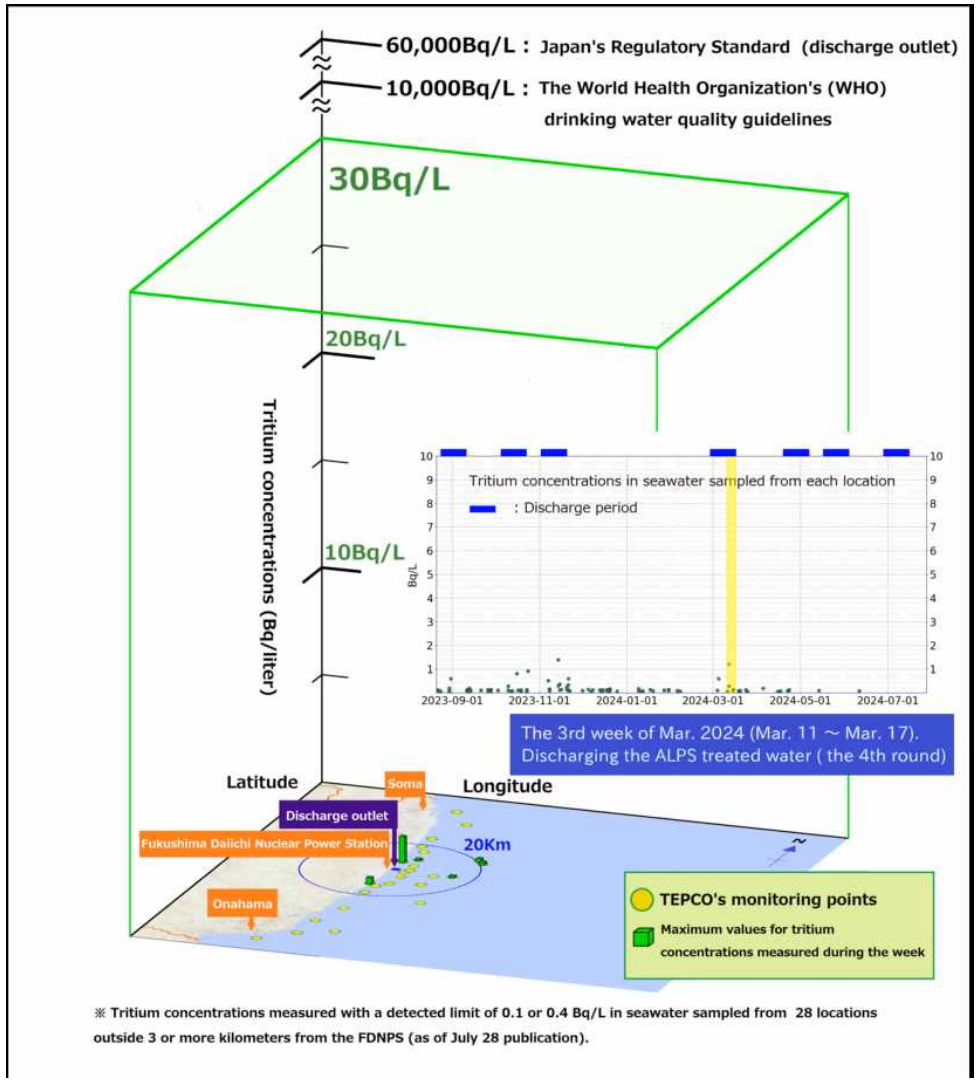
Red letter T-○ : Locations (10) where indicators (discharge suspension level, investigation level) have been set. Indicator (discharge suspension level): 700Bq/liter; indicator (investigation level): 350Bq/liter
Measurements that enable quick results to be obtained are additionally implemented in order to check to see if conditions differ from normal (tritium detection limit set at below 10Bq/liter)

Red letter T-○ : Locations (4) where indicators (discharge suspension determination level, investigation level) have been set. Indicator (discharge suspension determination level): 30Bq/liter; indicator (investigation level): 20Bq/liter
Measurements that enable quick results to be obtained are additionally implemented in order to check to see if conditions differ from normal (tritium detection limit set at below 10Bq/liter)

The change over time in tritium concentrations in seawater off the coast of Fukushima Prefecture for one year

TEPCO

＜A video showing the change over time in tritium concentrations in seawater off the coast of Fukushima Prefecture for one year from August 2023 will be screened.＞



＜Download the video here＞

Sea area tritium and cesium concentrations

＜Within a 3km radius outside the port＞

- Tritium concentrations (quick measurement) in the sea area during the six discharge sixth discharge period (24-6-10) remained within the range assumed in the diffusion simulation conducted in the prior to discharged water radiological impact assessment.
- Cesium-137 concentrations in seawater across Japan within a fluctuating range

＜Within a 20km radius offshore＞

- Both tritium and cesium-137 concentrations have been no changes from the past two years of measurements and have remained within the range of variation* of seawater across Japan.

＊：The following database shows the maximum and minimum values for concentrations detected between April 2019 and March 2022 throughout the whole of Japan (including off the coast of Fukushima Prefecture)

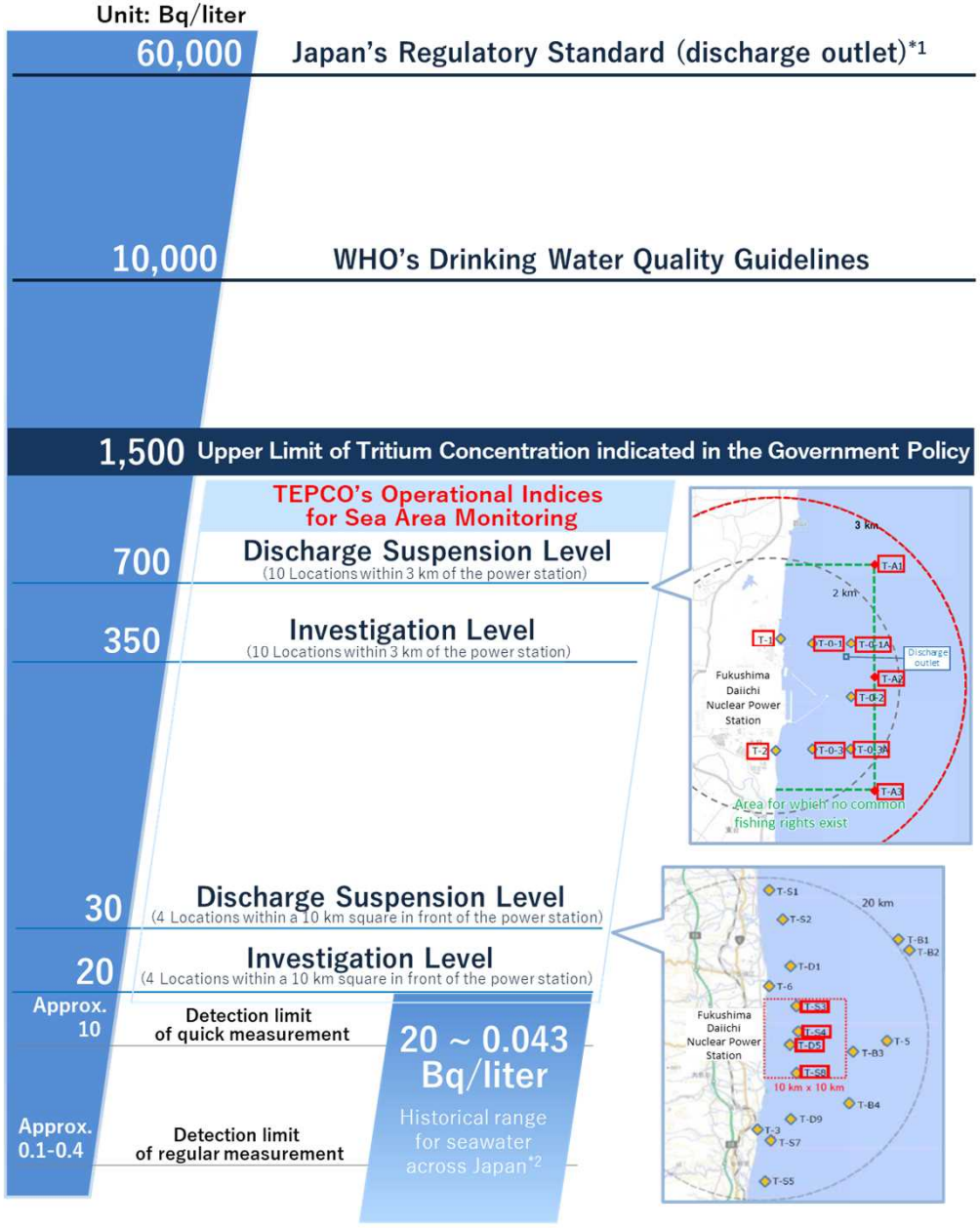
Tritium concentration: 0.043Bq/liter~20Bq/liter　Cesium-137 concentration: 0.0010Bq/liter~0.45Bq/liter

Source: Environmental Radioactivity and Radiation in Japan　Environmental Radiation Database　https://www.kankyo-hoshano.go.jp/data/database/

		Maximum concentrations between October 17~November 4, 2024
Tritium (quick measurement)	Within 3 km	48Bq/litter（Sample 200m from the discharge outlet on October 31）
	Within 20 km	Not detected＜8.3Bq/litter
Cesium-137	Within 3 km	Not detected（＜0.94Bq/litter）
	Within 20 km	—

Comparison of tritium concentration in seawater

- Since the commencement of discharge of ALPS treated water, we have confirmed that the tritium concentrations confirmed by monitoring in the Fukushima Prefecture sea area is well below the operational level (700 bq/litter) ,etc.
- In the future, although concentrations of tritium in discharged water will be higher, the monitoring results in the Fukushima prefecture sea area are expected to be within the expected range based on the sea dispersion simulation results for discharged water in the radiological impact assessment, and we assume that the concentration will be below the WHO's Drinking Water Quality Guidelines and other standards.

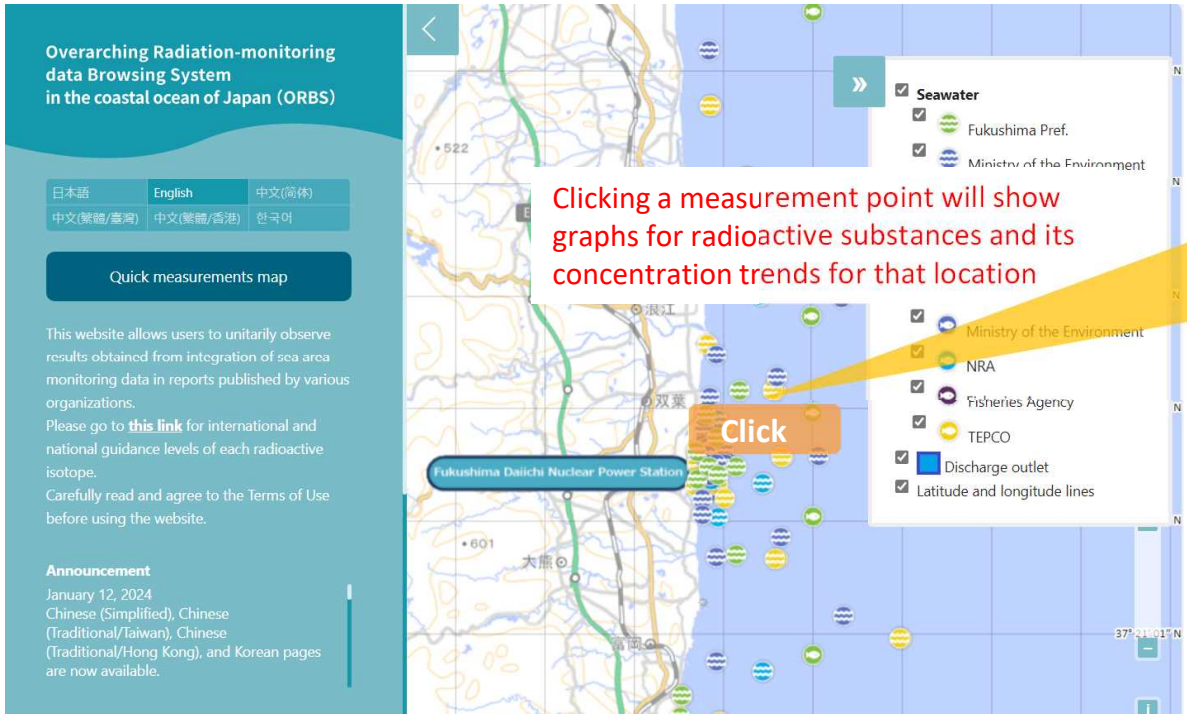


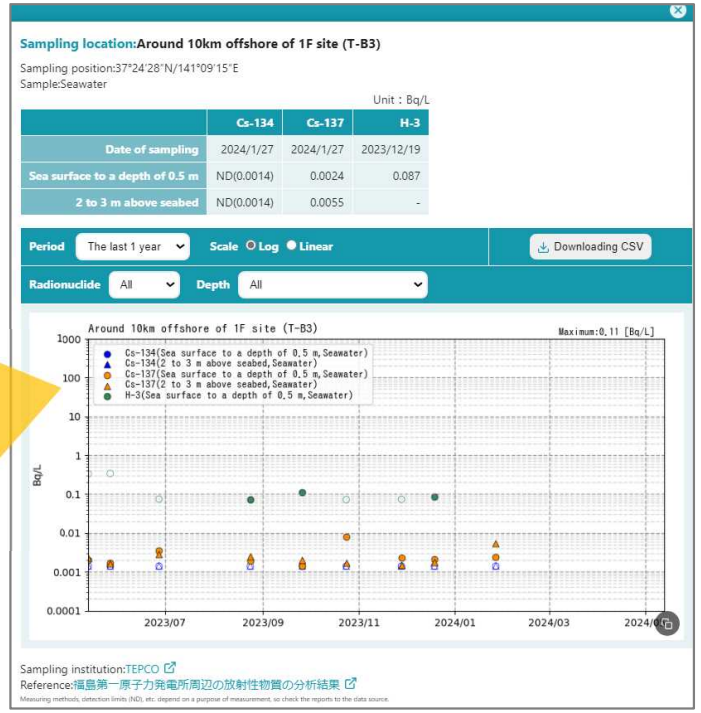
*1: This standard has been stipulated based on the calculation that if a person were to drink approximately 2L of the water coming out of the discharge outlet of a nuclear facility every day for one year, his/her exposure would be 1mSv.
*2: Source: Environmental Radioactivity and Radiation in Japan (Period: April 2019 to March 2022)

Sea area monitoring results

- In addition to data from TEPCO, data from each agency engaged in sea area monitoring (Fukushima Prefecture, Ministry of the Environment, Nuclear Regulation Authority, Fisheries Agency) can all be found on the Overarching Radiation-monitoring data Browsing System (ORBS) website.
- Information is provided in Japanese, English, Simplified Chinese, Traditional Chinese (Hong Kong), Traditional Chinese (Taiwan), and Korean.

Screen image of “Overarching Radiation-monitoring data Browsing System ”





Overarching Radiation-monitoring data Browsing System (ORBS)
https://www.monitororbs.jp/en/

Continued safety review by the IAEA after ALPS treated water discharges

- The safety of discharge of ALPS treated water has been reviewed by the International Atomic Energy Agency (IAEA) based on international safety standards.
- In April 2024, the IAEA Task Force visited Japan to conduct its second review mission on Handling of ALPS treated water at FDNPS after the start of the discharge . Later on July 18 in 2024, the IAEA published a report "Review of Safety Related Aspects of Handling ALPS treated water."

- **The Task Force* did not identify anything that is inconsistent with the requirements in the relevant international safety standards. Therefore, the IAEA can reaffirm the fundamental conclusions of its safety review as outlined in the 4 July 2023 Comprehensive Report.**
- **The Task Force confirmed that the equipment and facilities are installed and operated in a manner that is consistent with the Implementation Plan and the relevant international safety standards.**

*Six members of the IAEA officials and nine members of international experts have visited Japan.
(from Argentina, Australia, China, France, Republic of Korea, Russia, United Kingdom, United States and Vietnam)

The member of the IAEA Task Force visited Japan
(April 23 in 2024, METI)


The IAEA Task Force at the dilution facility
(April 25 in 2024, FDNPS)

Conclusions of the Comprehensive Report, (Published July in 2023)

- The approach to discharge ALPS treated water into the sea, and associated activities by TEPCO, NRA and the Government of Japan, are consistent with relevant international safety standards.
- The discharge of the ALPS treated water, as currently planned by the TEPCO, will have a negligible radiological impact on people and the environment.

Ensuring safety through facility inspections

- After the completion of the fourth discharge of ALPS treated water in FY2024 (24-4-8), sequential inspections of each facilities began in accordance with the long-term inspection plan
  - After completion of the fourth (24-4-8) and fifth (24-5-9) discharges, Group C facilities and Group A facilities were inspected, respectively
  - After completion of the sixth discharge (24-6-10), the facilities were stopped to perform inspections of Group B facilities (including a full inspection of the tanks) and common facilities (transfer/dilution/discharge/water intake facilities)