

Main decommissioning work and steps

Fuel removal from the spent fuel pool was completed on December 22 2014 at Unit 4 and February 28 2021 at Unit 3.

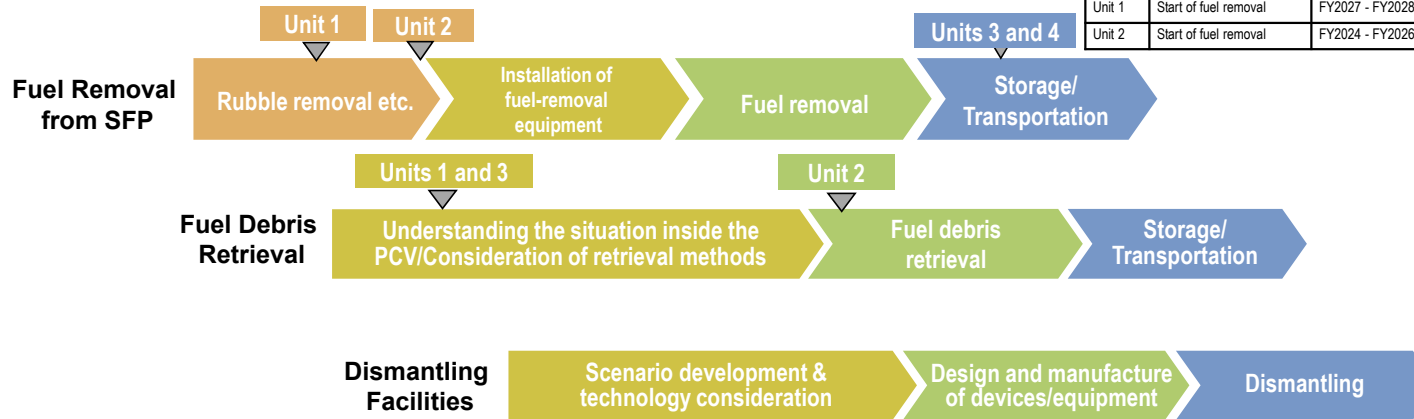
Trial fuel debris retrieval at Unit 2 commenced from September 10 2024 and a milestone of the Mid-and-Long-Term Roadmap "Commencing fuel debris retrieval at the first Unit" was achieved.

Work continues sequentially toward the start of fuel removal from Units 1 and 2 and fuel debris (Note 1) retrieval from Units 1-3.

(Note 1) Fuel assemblies having melted through in the accident with nearby metal materials etc.

<Milestones in the Mid-and-Long-Term Roadmap>

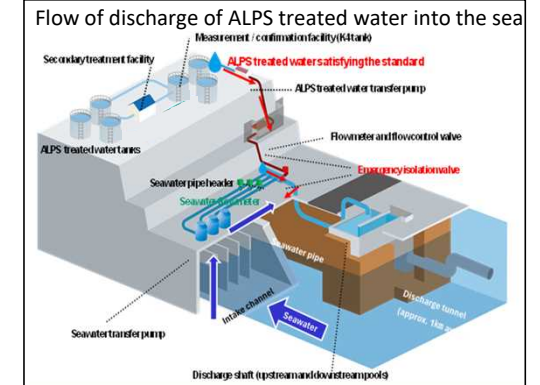
Units	Completion of fuel removal	Within 2031
Unit 1	Start of fuel removal	FY2027 - FY2028
Unit 2	Start of fuel removal	FY2024 - FY2026



Measures for treated water

Handling of ALPS treated water

Regarding the discharge of ALPS treated water into the sea, TEPCO must comply with regulatory and other safety standards to safeguard the public, the surrounding environment and agricultural, forestry and fishery products. To minimize adverse impacts on reputation, efforts including enhanced monitoring, ensuring objectivity and transparency by engaging with third-party experts and having safety checked by the IAEA, will continue. Moreover, accurate information will be disseminated with full transparency.



Contaminated water management - triple-pronged efforts -

(1) Efforts to promote contaminated water management based on the three basic policies

- "Removing" the contamination source
- "Redirecting" groundwater from the contamination source
- "Preventing leakage" of contaminated water

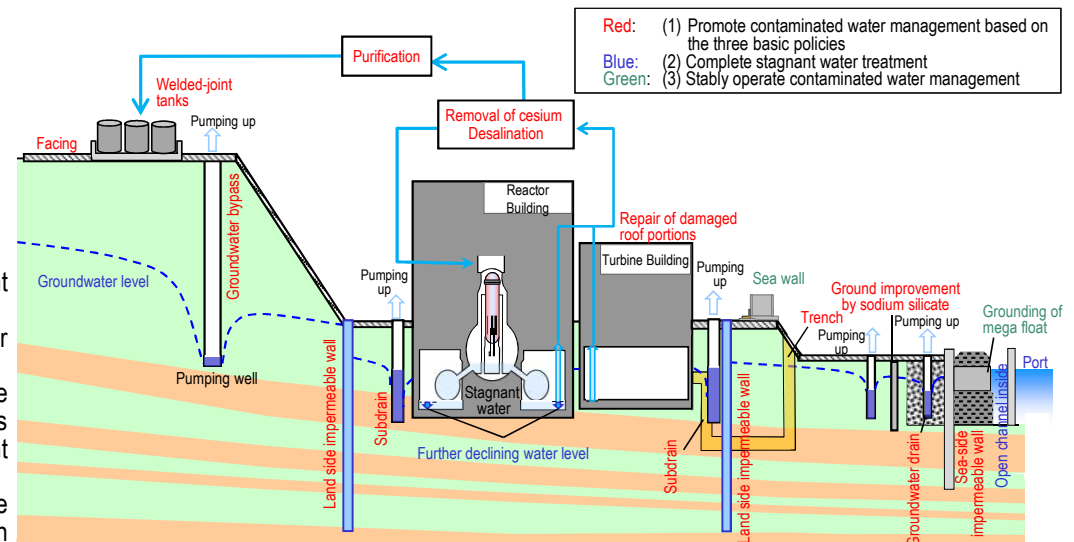
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal system) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and subdrains, have stabilized the groundwater at a low level and the increased contaminated water generated during rainfall is being suppressed by repairing damaged portions of the building roofs facing onsite. Through these measures, the generation of contaminated water has been suppressed and reduced, from approx. 540 m³/day (in May 2014) before implementing measures to approx. 80 m³/day (in FY2023), achieving the milestone of "suppressing the amount of contaminated water generated to 100 m³/day or less during average rainfall within FY2025."
- Measures will proceed to further reduce the amount of contaminated water generated and suppress it to approx. 50-70 m³/day by FY2028.

(2) Efforts to complete stagnant water treatment

- To reduce the stagnant water levels in buildings as planned, work to install additional stagnant water transfer equipment is underway.
- In 2020, treatment of stagnant water in buildings was completed, except for the Units 1-3 Reactor Buildings, Process Main Building and High-Temperature Incinerator Building.
- While assessing the dust impact, measures to reduce the stagnant water level were implemented. In March 2023, the target water level in each building was achieved. For the Units 1-3 Reactor Buildings, "reducing stagnant water in the Reactor Buildings to about half the amount at the end of 2020 during the period FY2022-2024" was achieved.
- For zeolite sandbags on the basement floors of the Process Main Building and High-Temperature Incinerator Building, measures to reduce the radiation dose are being examined with stabilization in mind.

(3) Efforts to stably operate contaminated water management

- As part of the tsunami countermeasures, openings in buildings were closed and work to install sea walls was completed. As countermeasures for heavy rain, sandbags are being installed to suppress direct inflow into buildings while work to enhance drainage channels and other measures is being implemented as planned.



Progress status

- ◆ The temperatures of the Reactor and the Primary Containment Vessel of Units 1-3 have been maintained stable. There was no significant change in the concentration of radioactive materials newly released from Reactor Buildings into the air. It was concluded that the comprehensive cold shutdown state had been maintained.

Status of ALPS treated water discharge into the sea

Planned inspections of ALPS treated water dilution and discharge facility and discharge/intake facility are currently under way. Except for the measurement/confirmation tank group B (to be completed in around May 2025), no abnormalities that could affect the discharge schedule were found.

To confirm that the facility status has not changed since the initial discharges into the sea (1st~3rd discharges of FY2023), this confirmation shall be implemented once a year. The 7th discharge to be implemented in FY2024 will be discharged in two stages: before discharge, a small amount of ALPS treated water diluted with seawater will be stored in the upper - stream storage pool and the tritium concentration will be measured (1st Stage); and while the remaining ALPS treated water is diluted with seawater, continuous discharge will be implemented (2nd Stage).

In preparation for the 1st discharge in FY2025, circulation/agitation has commenced for tank group A since February 13 and sampling was conducted on February 21. Analysis is underway.

The J9 area tanks were taken out of service on February 13 and dismantling began on February 14. Dismantling of the first tank will be completed around the beginning of March 2025.

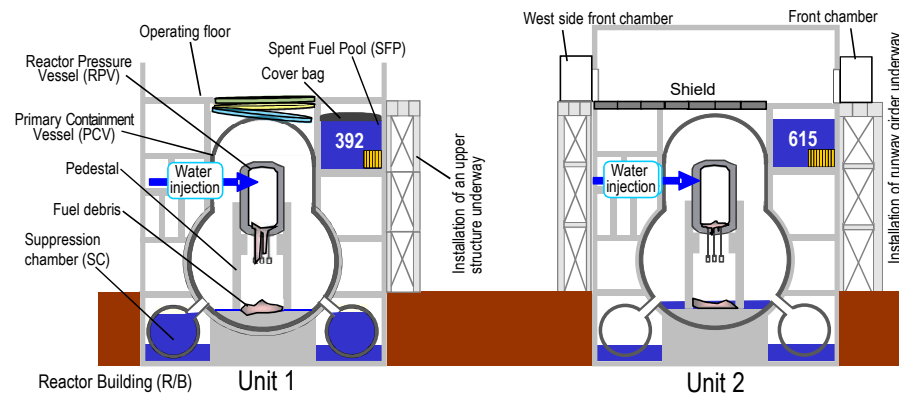
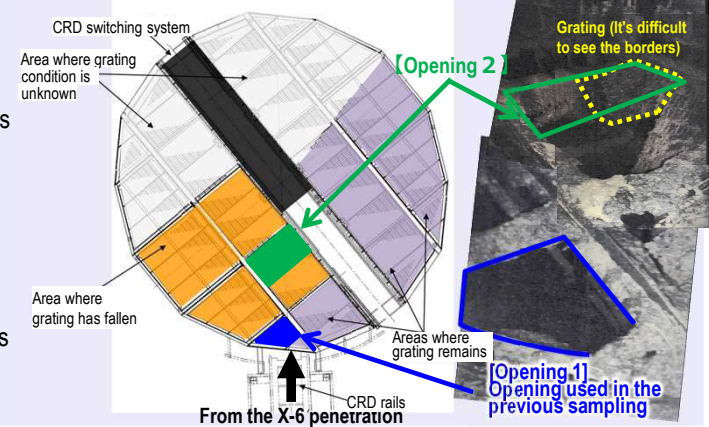


<Removing the top lid in J9 area tanks (February 14)>

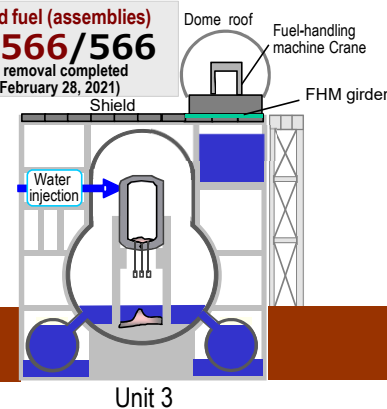
Unit 2 Progress status of fuel debris trial retrieval

In preparation for the next fuel debris retrieval by the telescopic device, a work plan is being examined.

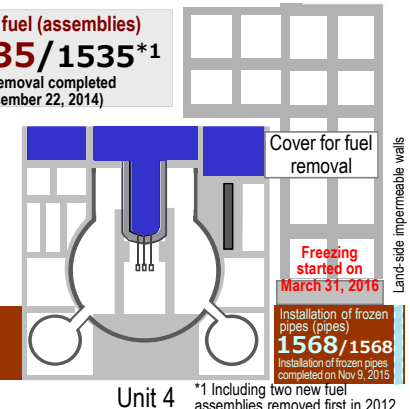
As an opening that provides access to the bottom of the pedestal, opening 2 on the far side from the previous investigation will be investigated. After determining whether access is possible, fuel debris will be retrieved through opening 2 if access is possible and through opening 1, as in the previous sampling, if access through opening 2 is not possible.



Removed fuel (assemblies)
566/566
(Fuel removal completed on February 28, 2021)



Removed fuel (assemblies)
1535/1535*1
(Fuel removal completed on December 22, 2014)



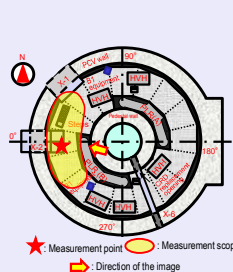
*1 Including two new fuel assemblies removed first in 2012.

Unit 1 Environmental investigation inside the PCV

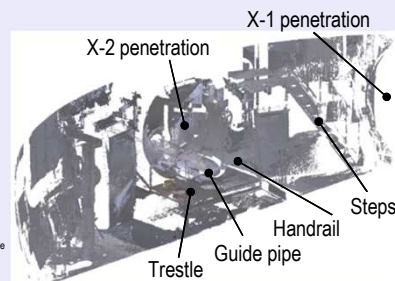
In Unit 1, work undertaken to reduce the PCV water level may result in deposits being exposed to the air and the level of airborne radiation dose and haze may change. A summer investigation was conducted from September to October in 2024 and a winter investigation was conducted as initially planned.

Based on the investigative results, a comparison of the haze state assumed no significant difference detected before and after the reduction in PCV water level, but more haze in winter than summer. Moreover, no significant difference was detected in the air dose rate before and after the PCV water level reduction.

Based on laser scan data acquired in this investigation, a mockup training facility resembling the site more closely will be manufactured to utilize in effective tests and training.



< Laser scan measurement results around X-2 penetration >

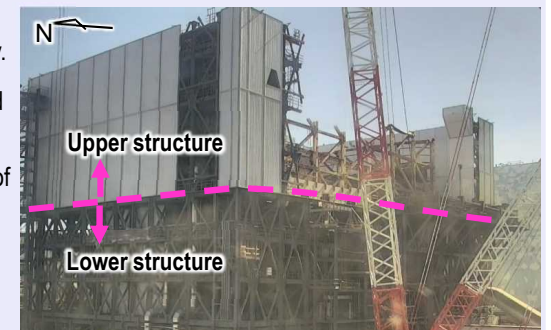


Unit 1 Progress of work in preparation for fuel removal

Before installing a large cover over the Reactor Building, ground assembly of steel frames in the off-site yard and installation on-site are underway.

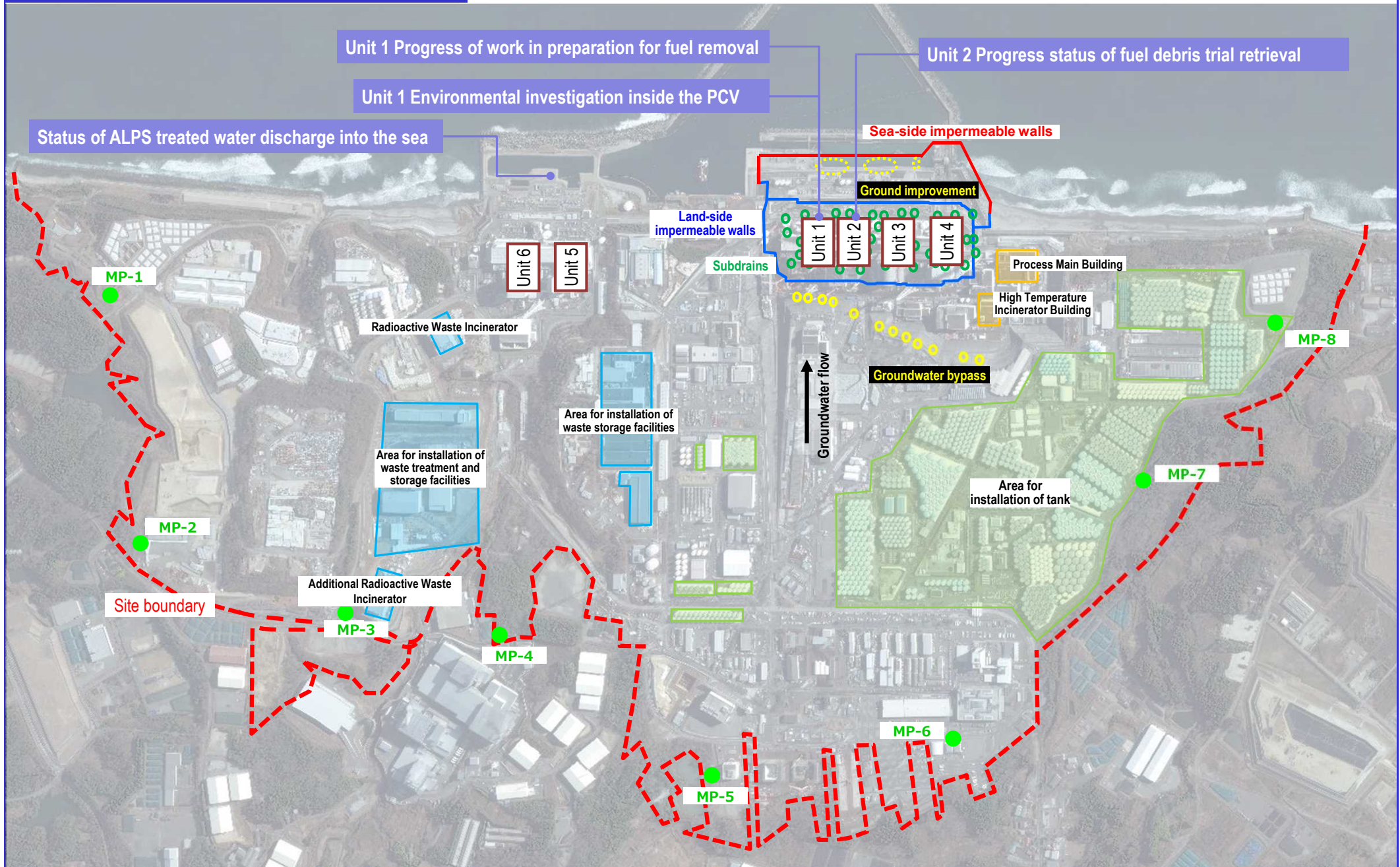
In the off-site yard, ground assembly of the temporary gantry, upper and lower structures and box ring was completed. At present, ground assembly of three of eight blocks for the moving roof was completed. On-site, installation of nine of a total dozen blocks for the upper structure was completed.

To reduce the risk of coming into contact with the large cover and enhance seismic safety, a portion of the perimeter steel frames is being removed. No significant increase in dust concentration was detected during removal. Work to spray anti-scattering agents and monitoring will continue.



< On-site status (northwest side) (February 25) >

Major initiatives – Locations on site

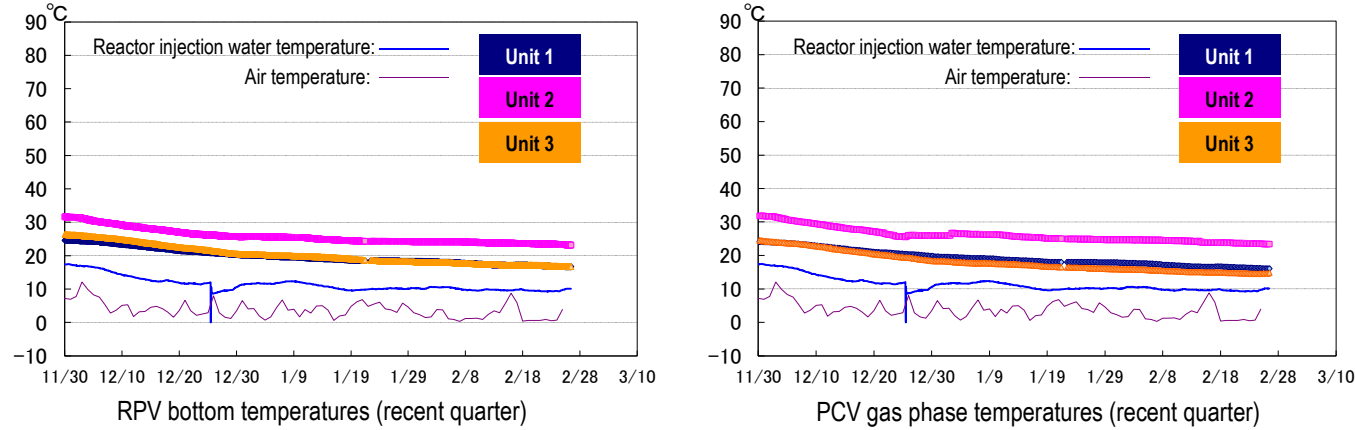


Provided by Japan Space Imaging Corp., photo taken on January 14, 2024
Product (C) [2024] Maxar Technologies.

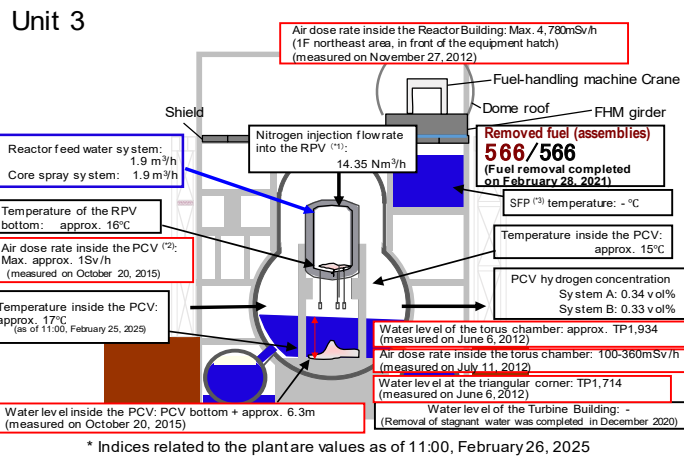
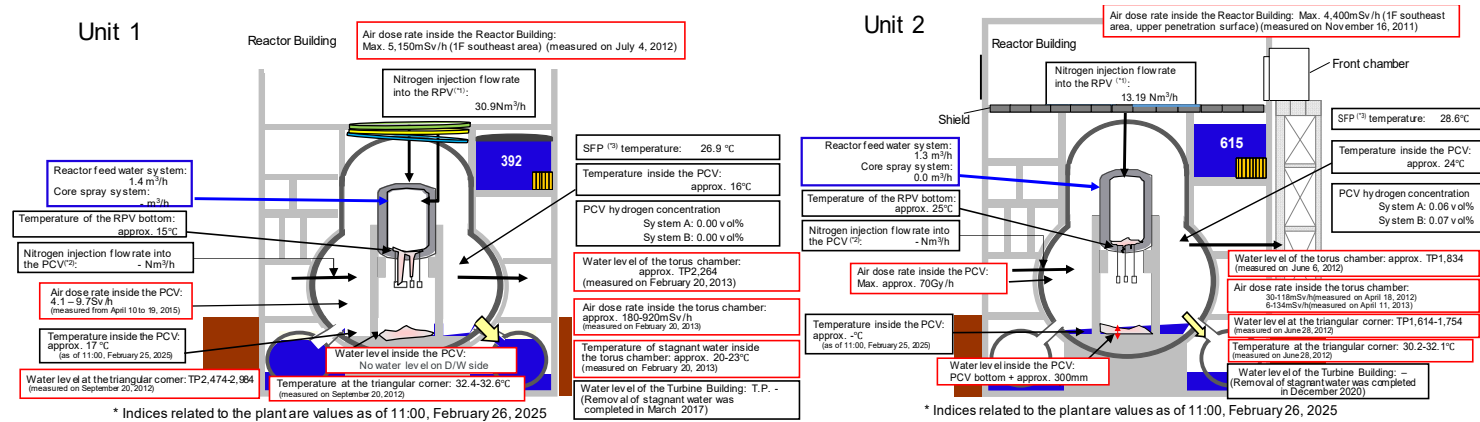
I. Confirmation of the reactor conditions

Temperatures inside the reactors

Through continuous reactor cooling by water injection, the temperatures of the Reactor Pressure Vessel (RPV) bottom and the Primary Containment Vessel (PCV) gas phase were maintained as shown below for recent, though they varied depending on the unit and location of the thermometer.



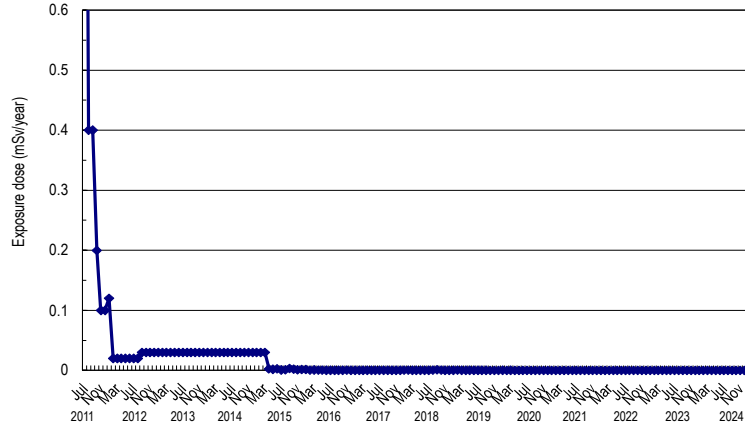
*1 The trend graphs show part of the temperature data measured at multiple points.
*2 A part of data could not be measured due to maintenance and inspection of the facility and other work.



Release of radioactive materials from the Reactor Buildings

As of January 2025, the concentration of radioactive materials newly released from Reactor Building Units 1-4 into the air and measured at the site boundary was evaluated at approx. 1.0×10^{-11} Bq/cm³ and 1.2×10^{-11} Bq/cm³ for Cs-134 and -137 respectively, while the radiation exposure dose due to the release of radioactive materials there was less than 0.00005 mSv/year.

Annual radiation dose at site boundaries by radioactive materials (cesium) released from Reactor Building Units 1-4



(Reference)

* The concentration limit of radioactive materials in the air outside the surrounding monitoring area:
[Cs-134]: 2×10^{-5} Bq/cm³
[Cs-137]: 3×10^{-5} Bq/cm³
* Data of Monitoring Posts (MP1-MP8).
Data of Monitoring Posts (MPs) measuring the air dose rate around the site boundary showed 0.301-0.984 μ Sv/h (January 29 - February 25, 2025).
To measure the variation in the air dose rate of MP2-MP8 more accurately, work to improve the environment (trimming trees, removing surface soil and shielding around the MPs) was completed.

- Note 1: Different formulas and coefficients were used to evaluate the radiation dose in the facility operation plan and monthly report. The evaluation methods were integrated in September 2012. As the fuel removal from the spent fuel pool (SFP) commenced for Unit 4, the radiation exposure dose from Unit 4 was added to the items subject to evaluation since November 2013. The evaluation has been changed to a method considering the values of continuous dust monitors since FY2015, with data to be evaluated monthly and announced the following month.
- Note 2: Radiation dose was calculated using the evaluation values of release amount from Units 1-4 and Units 5 and 6. The radiation dose of Unit 5 and 6 was evaluated based on expected release amount during operation until September 2019 but the evaluation method was reviewed and changed to calculate based on the actual measurement results of Units 5 and 6 from October.
- Note 3: Dose assessment has been changed since July 2024 due to the change of standard meteorology, etc. in the implementation plan (effective July 8, 2024).

Other indices

There was no significant change in indices, including the pressure in the PCV and the PCV radioactivity density (Xe-135) for monitoring criticality, nor was any anomaly in the cold shutdown state or criticality sign detected.

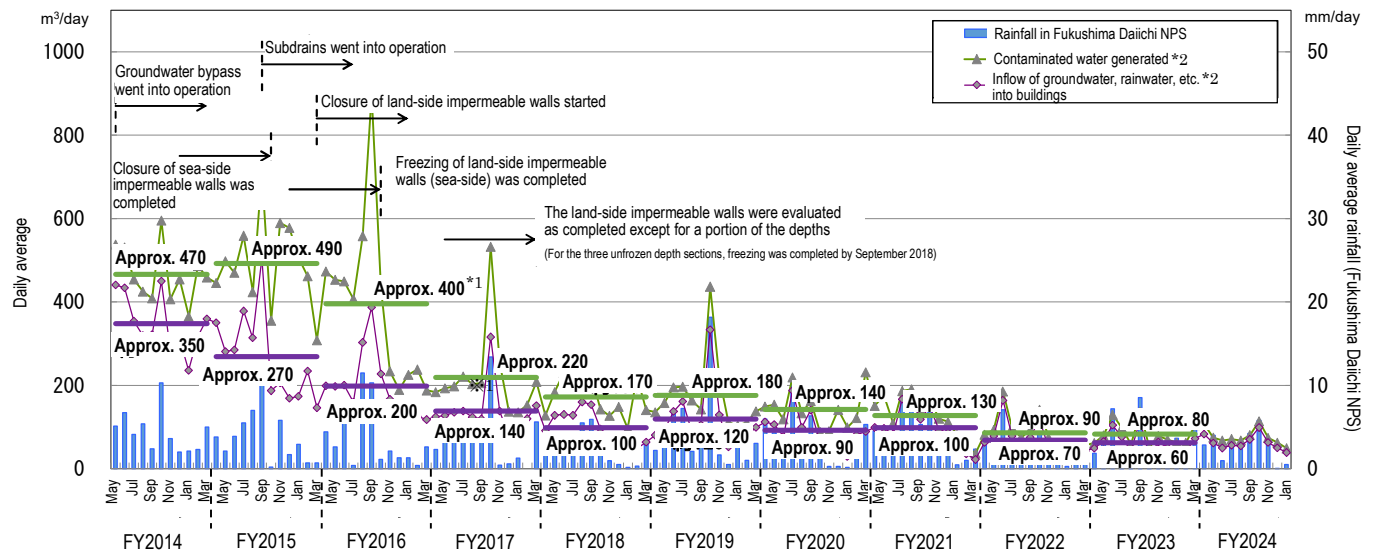
Based on the above, it was confirmed that the comprehensive cold shutdown state had been maintained and the reactors remained in a stabilized condition.

II. Progress status by each plan

Measures for contaminated water and treated water

➤ Status of contaminated water generated

- Multi-layered contaminated water management measures, including land-side impermeable walls and subdrains, have stabilized the groundwater at a low level and the increased contaminated water generated during rainfall is being suppressed by repairing damaged portions of building roofs facing onsite. Through these measures, the generation of contaminated water has been suppressed and reduced from approx. 540 m³/day (in May 2014) before implementing measures to approx. 80 m³/day (in FY2023), achieving the milestone to “suppress the amount of contaminated water generated to 100 m³/day or less during average rainfall within FY2025.”
- Measures will proceed to further reduce the amount of contaminated water generated and suppress to approx. 50-70 m³/day by FY2028.



*1 Values differ from those announced at the 20th Committee on Countermeasures for Contaminated Water Treatment (held on August 25, 2017) because the method of calculating the contaminated water volume generated was reviewed on March 1, 2018. Details of the review are described in the materials for the 50th and 51st meetings of the Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment.

*2: The monthly daily average is derived from the daily average from the previous Thursday to the last Wednesday, which is calculated based on the data measured at 7:00 on every Thursday

Figure 1: Changes in contaminated water generated and inflow of groundwater and rainwater into buildings

➤ Operation of the Water-Treatment Facility Special for Subdrains & Groundwater drains

- At the Water-Treatment Facility Special for Subdrain & Groundwater drains, release started from September 14, 2015 and up until February 17, 2025, 2638 release operations had been conducted. The water quality of all temporary storage tanks satisfied the operational target.

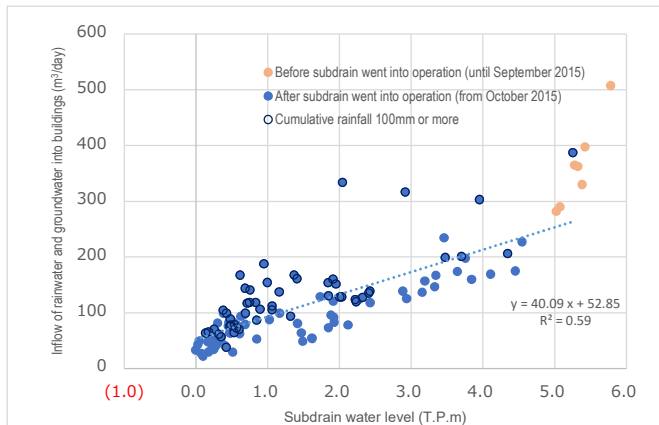


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 subdrains

➤ Implementation status of facing

- Facing is a measure that involves asphaltting the on-site surface to reduce the radiation dose, prevent rainwater infiltrating the ground and reduce the amount of underground water flowing into buildings. As of the end of January 2025, 96% of the planned area (1,450,000 m² on site) had been completed. For the area inside the land-side impermeable walls, implementation proceeds appropriately after constructing a yard from implementable zones that leave the decommissioning work unaffected. As of the end of January 2025, 50% of the planned area (60,000 m²) had been completed.

➤ Status of the groundwater level around buildings

- Regarding the groundwater level in the area inside the land-side impermeable walls, the difference between the inside and outside has remained constant, though the groundwater level on the mountain side varied due to rainfall. The groundwater level of the groundwater drain observation well remained sufficiently lower than the ground surface, at around T.P.+1.4m (the height of the ground surface: T.P.+2.5m).
- Regarding the subdrains of Units 1-4, the pumping amount varied depending on precipitation. The pumping amount in the T.P.+2.5m area remained constant after the facing in this area was completed.

➤ Operation of the multi-nuclide removal system and other water-treatment facilities

- Regarding the multi-nuclide removal system (existing), hot tests using radioactive water were conducted (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013). On March 23, 2022, an inspection prior-to-use certificate was granted by the Nuclear Regulation Authority (NRA) and the entire inspection prior to use was completed. For the multi-nuclide removal system (additional), an inspection prior to use certificate was granted by the NRA on October 12, 2017. Regarding the multi-nuclide removal system (high-performance), hot tests using radioactive water were conducted from October 18, 2014. In March 2, 2023, an inspection prior to use certificate was granted by the NRA and the entire inspection prior to use was completed.
- Treatment measures comprising the removal of strontium by cesium-adsorption apparatus (KURION), the secondary cesium-adsorption apparatus (SARRY) and the third cesium-adsorption apparatus (SARRY II) continued. Up until February 20, 2025, approx. 783,000 m³ had been treated.

➤ Risk reduction of strontium-reduced water

- To reduce the risks of strontium-reduced water, treatment using existing, additional and high-performance multi-nuclide removal system is underway. Up until February 20, 2025, approx. 949,000 m³ had been treated.

➤ Storage status of stagnant water and amount of ALPS treated water, etc. stored in tanks

- The volume of ALPS treated water, etc. was approx. 1,287,680 m³ as of February 20, 2025.
- The total volume of ALPS treated water discharged into the sea since the discharge commenced on August 24, 2023 was approx. 78,285 m³ as of February 26, 2025.

As of February 20, 2025

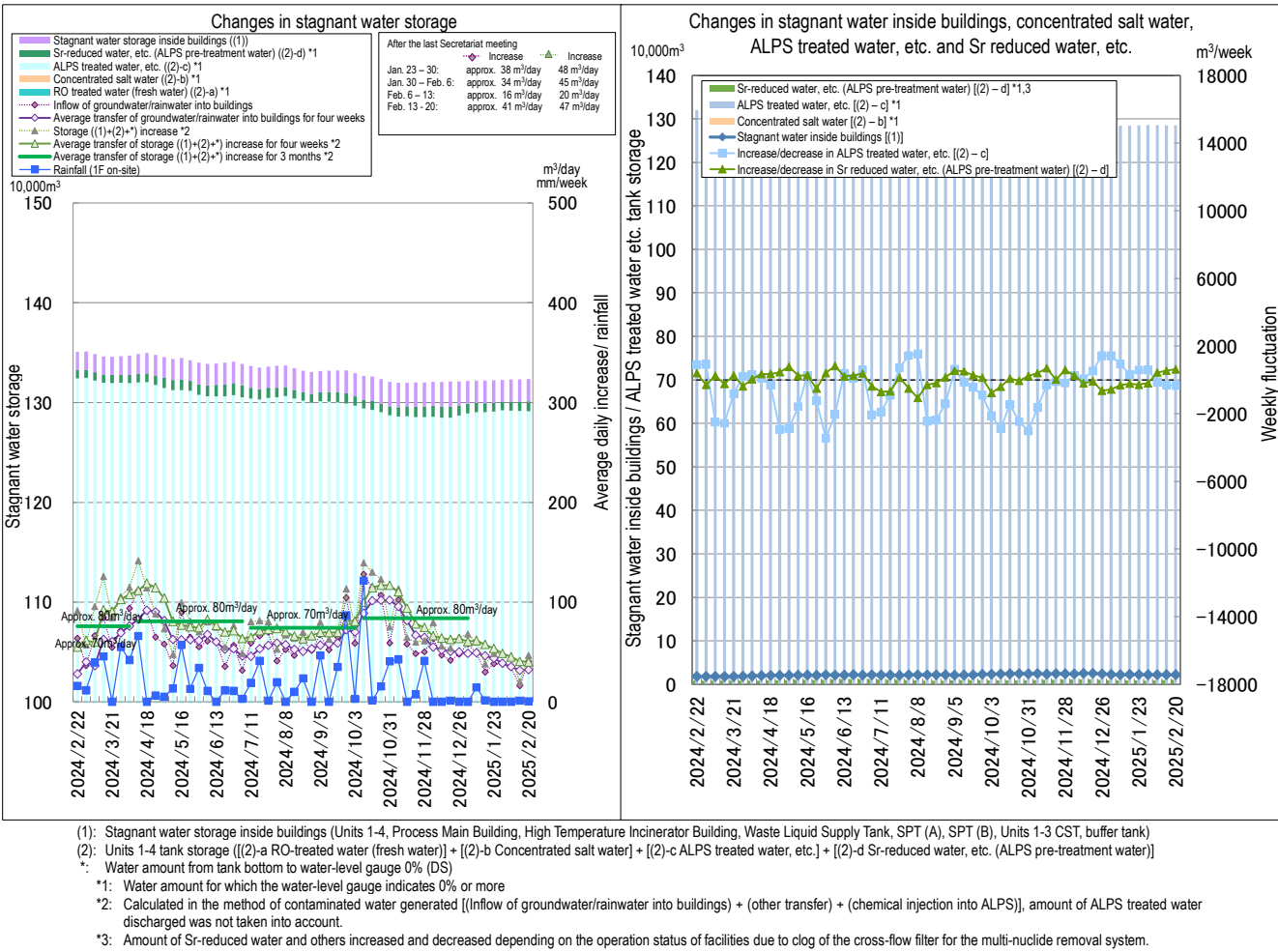


Figure 3: Status of stagnant water storage

➤ Status of discharge of ALPS treated water

As of February 26, 2025

Measurement object	Requirement and operation target	Measurement results	Compliance with requirement
[TEPCO] Tritium concentration in seawater (sea-area monitoring at 4 points within 3 km of the Power Station)	• Discharge suspension level: 700 Bq/L or less • Investigation level: 350 Bq/L or less	(Sampled on February 24) • Below the lower detection limit (less than 7.2 - 8.0 Bq/L)	○ ○
[TEPCO] Tritium concentration in seawater (sea-area monitoring at 1 point within 10 km square from the Power Station)	• Discharge suspension level: 30 Bq/L or less • Investigation level: 20 Bq/L or less	(Sampled on February 24) • Below the lower detection limit (less than 7.9 Bq/L)	○ ○
[Ministry of the Environment] Tritium concentration in seawater (at 3 points off the coast of Fukushima Prefecture)	• National safety requirement: 60,000 Bq/L • WHO drinking water guidelines: 10,000 Bq/L	(Sampled on January 21) • Below the lower detection limit (less than 8 Bq/L)	○ ○
[Fisheries Agency] Tritium concentration in marine products (flounder and others)	-	(Sampled on February 17) • Below the lower detection limit (less than 7.9 Bq/kg)	○
[Fukushima Prefecture] Tritium concentration in seawater (at 9 points off the coast of Fukushima Prefecture)	• National safety requirement: 60,000 Bq/L • WHO drinking water guidelines: 10,000 Bq/L	(Sampled on January 24) • Below the lower detection limit (less than 3.8 - 4.5 Bq/L)	○ ○

- From October 17 to November 4, 2024, the sixth discharge of ALPS treated water into the sea in FY2024 was conducted.
- Regarding the status of sea-area monitoring on handling ALPS treated water, more tritium measurement points for

seawater and fish were established near the power station and off the coast of Fukushima Prefecture and measurements of tritium and Iodine-129 of seaweed near the power station were added from April 20, 2022. As of February 26, 2025, no significant variation had been detected.

- Regarding sea-area monitoring conducted by TEPCO at four points within 3 km of the power station, quick measurements taken of the tritium concentration in the seawater sampled on February 24 showed concentrations under the detection limit (less than 7.2 – 8.0 Bq/L) at all points, which was below the TEPCO operation indices of 700 Bq/L (discharge suspension level) and 350 Bq/L (investigation level).
- Regarding sea-area monitoring conducted by TEPCO at 1 point within 10 square km of the power station, quick measurements taken of the tritium concentration in the seawater sampled on February 24 showed concentrations under the detection limit (less than 7.9 Bq/L) at all points, which was below the TEPCO operation indices of 30 Bq/L (discharge suspension level) and 20 Bq/L (investigation level).
- The quick measurement results obtained by each organization were as follows:
Ministry of the Environment: The analytical results (obtained via quick measurements) for seawater sampled on January 21 at 3 points off the coast of Fukushima Prefecture showed tritium concentrations below the lower detection limit (less than 8 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.
Fisheries Agency: Quick analytical results for tritium in flounder sampled on February 17 showed tritium concentrations below the lower detection limit (less than 7.9 Bq/kg) in all samples.
Fukushima Prefecture: On January 24, tritium concentrations in seawater at 9 sampling points off the coast of Fukushima Prefecture below the lower detection limit were recorded (less than 3.8 – 4.5 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.

➤ Progress of the rearing test of marine organisms in the Fukushima Daiichi Nuclear Power Station

- To eliminate concerns and reassure the public, a rearing test for marine organisms (flounder) in seawater with ALPS treated water added and normal seawater for comparison is underway.
- [Facility for rearing test of marine organisms (on-site)] Regarding the flounder and abalones, in both series of tanks (“normal seawater” and “diluted ALPS treated water with seawater”), no mass death or abnormality was detected (as of February 20).
- [Facility for rearing test of marine organisms (off site)] Since the rearing test using water discharged in the environment commenced, no significant change has been detected in the growth situation of flounder and abalones (as of February 20).
- Rearing of flounder and others in diluted ALPS treated water (less than 1,500 Bq/L) will continue.
- Rearing of flounder and others in water discharged into the environment will continue.
- The Organically-Bound Tritium (OBT) concentration test on flounder (less than 1,500 Bq/L) will continue.

Fuel removal from the spent fuel pools

Work to help remove spent fuel from the pool is progressing steadily while ensuring seismic capacity and safety.

➤ Main work to remove spent fuel at Unit 1

- Before installing a large cover over the Reactor Building, ground assembly of steel frames in the off-site yard and installation on-site were commenced.
- In the off-site yard, ground assembly of the temporary gantry, upper and lower structures and box ring was completed. Ground assembly of three of eight blocks for the moving roof was completed. On-site, the installation of nine of a total 12 blocks for the upper structure was completed.
- To reduce the risk of coming into contact with the large cover and enhance seismic safety, a portion of the perimeter steel frames is being removed. No significant increase in dust concentration was detected during removal. Spraying of anti-scattering agents and monitoring will continue.

➤ Main work to remove the spent fuel at Unit 2

- Work to install a runway girder, which will support rails to be used when the fuel removal system moves between the Reactor Building and the front chamber is underway. The runway girder comprises eight steel blocks. After being assembled off site, blocks are carried in on site and installed in the front room of the Reactor Building. Installation

commenced from October 2024 and six of a total eight blocks were carried into the front room.

- At the factory, trial operation related to each equipment component of the fuel removal system continues. As a specific example, using a mockup transportation cask, the operational state of the crane is verified. After the trial operation and covering the system, it will be transported by sea.
- #### ➤ Unit 4 Removal of high-dose equipment, such as control rods, in the spent fuel pool
- Regarding spent fuel stored in the Unit 4 spent fuel pool (SFP), removal was completed in 2014, but high-dose equipment, such as control rods, remains there.
 - The investigative results inside the SFP conducted from May to June 2021 and June 2022 did not confirm any state which would significantly affect the removal of high-dose equipment. Accordingly, the removal from control rods and channel boxes inside the SFP will commence.
 - Inspection and repair of the crane to be used to remove high-dose equipment is currently underway. After related work such as crane repair is completed, a one-through confirmation using the actual transportation cask will be conducted. After preparation is completed, removal of high-dose equipment will commence in around late March.
 - The removed high-dose equipment will be transported to an appropriate on-site storage location based on the level of contamination and radiation dose.
 - The fuel-handling machine of Unit 4 will be carried out to be used in Unit 1. Accordingly, removal of high-dose equipment in Unit 4 will be suspended in the second quarter of FY2025. The timing at which removal will resume will be decided based on the installation of a new site banker and other conditions due to the tight capacity of site banker storage.

Fuel debris retrieval

➤ Unit 2 Analysis of X-6 penetration related samples

- To assume the accident development and the state inside the Primary Containment Vessel and acquire information leading to indirectly assuming the fuel debris characteristics, samples are taken from various parts for analysis.
- When the hatch of the Unit 2 PCV penetration (X-6 penetration) was opened in 2023, new samples, including deposit pieces having fallen from the hatch lid (Sample (1)) and smear filter paper wiping off a scraper which touched the hatch lid (Sample (2)), were acquired. In addition to the adhesion to the investigative device previously reported (Sample (3)), analysis was conducted to enhance knowledge.
- Regarding the radiation concentration inside the deposit, the proportion of volatile fission products of Cs-134 and Cs-137 was smaller and that of Am-241 and Eu-154 was larger.
- As main components of the deposit, the proportion of components derived from structural materials of Fe, Cr and Ni was larger, fuel-derived components of U and Zr were contained and no C was detected. Moreover, the deposit mainly comprised ferric oxide particles 1-3µm in size or smaller and particles including U of about dozens-100µm.
- It was confirmed that almost no cable coating material melt component remained inside the deposit.

Plans to store, process and dispose of solid waste and decommission of reactor facilities

Promoting efforts to reduce and store waste generated appropriately and R&D to facilitate adequate and safe storage, processing and disposal of radioactive waste

➤ Management status of rubble and trimmed trees

- As of the end of January 2025, the total storage volume for concrete and metal rubble was approx. 404,800 m³ (+1,900 m³ compared to the end of December 2024 with an area-occupation rate of 73%). The total storage volume of trimmed trees was approx. 70,300 m³ (+100 m³, with an area-occupation rate of 40%). The total storage volume of used protective clothing was approx. 9,300 m³ (+100 m³, with an area-occupation rate of 37%). The total storage volume of radioactive solid waste (incinerated ash and others) was approx. 38,400 m³ (a slight increase, with an area-occupation rate of 60%). The increase in rubble was due to decontamination of flanged tanks, work related to site preparation and work related to the area around the buildings of Units 1-4, etc.

➤ Management status of secondary waste from water treatment

- As of February 6, 2025, the total storage volume of waste sludge was 477 m³ (area-occupation rate: 68%), while that

of concentrated waste fluid was 9,462 m³ (area-occupation rate: 92%). The total number of stored spent vessels, High-Integrity Containers (HICs) for the multi-nuclide removal system and others, was 5,860 (area-occupation rate: 88%).

➤ Additional Radioactive Waste Incinerator Progress status toward facility restoration

- In response to the steam and gas generation associated with fermentation and heat generation of chips and the subsequent fire alarm activation on February 22, 2024 at the waste storage pit of the Additional Radioactive Waste Incinerator, water was injected into the waste storage pit from February 23 to 25, 2024. The impact of this incident meant the incinerator is being suspended.
- After collection of chips and water inside the pit was completed on December 24, 2024, peeling was detected in a concrete portion of the pit. The next phase will involve investigating and assessing the soundness of the waste storage pit to make necessary repairs.
- Full-scale restoration work on the facility will commence in the fourth quarter of FY2024. Simultaneously, countermeasures to ensure operational safety and periodical inspection of the equipment in operation will also be conducted and restoration of the facility will be completed within FY2025.

Reduction in radiation dose and mitigation of contamination

Effective dose-reduction at site boundaries and purification of port water to mitigate the impact of radiation on the external environment

➤ Status of the groundwater and seawater on the east side of Turbine Building Units 1-4

- In the Unit 1 intake north side area, the H-3 concentration was below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or has been declining overall. The concentration of total β radioactive materials has remained constant overall but increased temporarily from April 2020 and is even currently increasing or declining at a low concentration at observation holes including Nos. 0-1, 0-1-2, 0-2, 0-3-1, 0-3-2 and 0-4. The trend continues to be carefully monitored.
- In the area between the Units 1 and 2 intakes, the H-3 concentration has remained below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing or declining at Nos. 1-14 and 1-17 but has otherwise remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but has been increasing at No. 1-6 and increasing or declining at low concentration at Nos. 1-8, 1-9, 1-11, 1-12 and 1-14. The trend continues to be carefully monitored.
- In the area between the Unit 2 and 3 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has remained constant or been declining at many observation holes overall. The concentration of total β radioactive materials has remained constant overall but has been increasing and larger fluctuation was seen at No. 2-5. The trend continues to be carefully monitored.
- In the area between the Unit 3 and 4 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but has been increasing or declining at Nos. 3-4 and 3-5. The trend continues to be carefully monitored.
- In the groundwater on the east side of the Turbine Buildings, as with the total β radioactive materials, the concentration of cesium has also remained constant as the overall area but been increasing or declining at observation holes with a low concentration and exceeded the previous highest record at some observation holes. Investigations will continue, including to ascertain the impact of rainfall.
- The concentration of radioactive materials in drainage channels has remained constant overall, despite increasing during rainfall. In Drainage Channel D, drainage of the low-dose area on the west side of the site started to pass from August 30, 2022. It has remained low, despite concentrations of cesium and total β radioactive materials increasing during rainfall. From November 29, 2022, continuous monitors were installed and drainage around the Units 1 and 2 switch yard started to pass.
- In the open channel area of the seawater intake for Units 1 to 4, the concentration of radioactive materials in seawater has remained below the legal discharge limit and been declining long term, despite the temporary increases in Cs-

137 and Sr-90 observed during rainfall. They have also been declining following the completed installation and the connection of steel pipe sheet piles for the sea-side impermeable walls. The concentration of Cs-137 remained slightly higher in front of the south-side impermeable walls and slightly lower on the north side of the east breakwater since March 20, 2019, when the silt fence was transferred to the center of the open channel due to mega float-related construction.

- In the port area, the concentration of radioactive materials in seawater has remained below the legal discharge limit and been declining long term, despite temporary increases in Cs-137 and Sr-90 observed during rainfall. They have remained below the level of those in the Units 1-4 intake open channel area and been declining following the completed installation and connection of steel pipe sheet piles for the sea-side impermeable walls.
- In the area outside the port, regarding the concentration of radioactive materials in seawater, those of Cs-137 and Sr-90 declined and remained low after steel pipe sheet piles for the sea-side impermeable walls were installed and connected. Regarding the concentration of Cs-137, a temporary increase was sometimes observed on the north side of the Unit 5 and 6 outlets and near the south outlet due to the influence of weather, marine meteorology and other factors. Regarding the concentration of Sr-90, variation was observed in FY2021 in the area outside the port (north and south outlets). Monitoring of the tendency continues, including the potential influence of weather, marine meteorology and others. During the period for which ALPS treated water was discharged, the tritium concentration increased at the sampling point near the discharge outlet, but this was considered within the assumed range based on the oceanic dispersion simulation results.

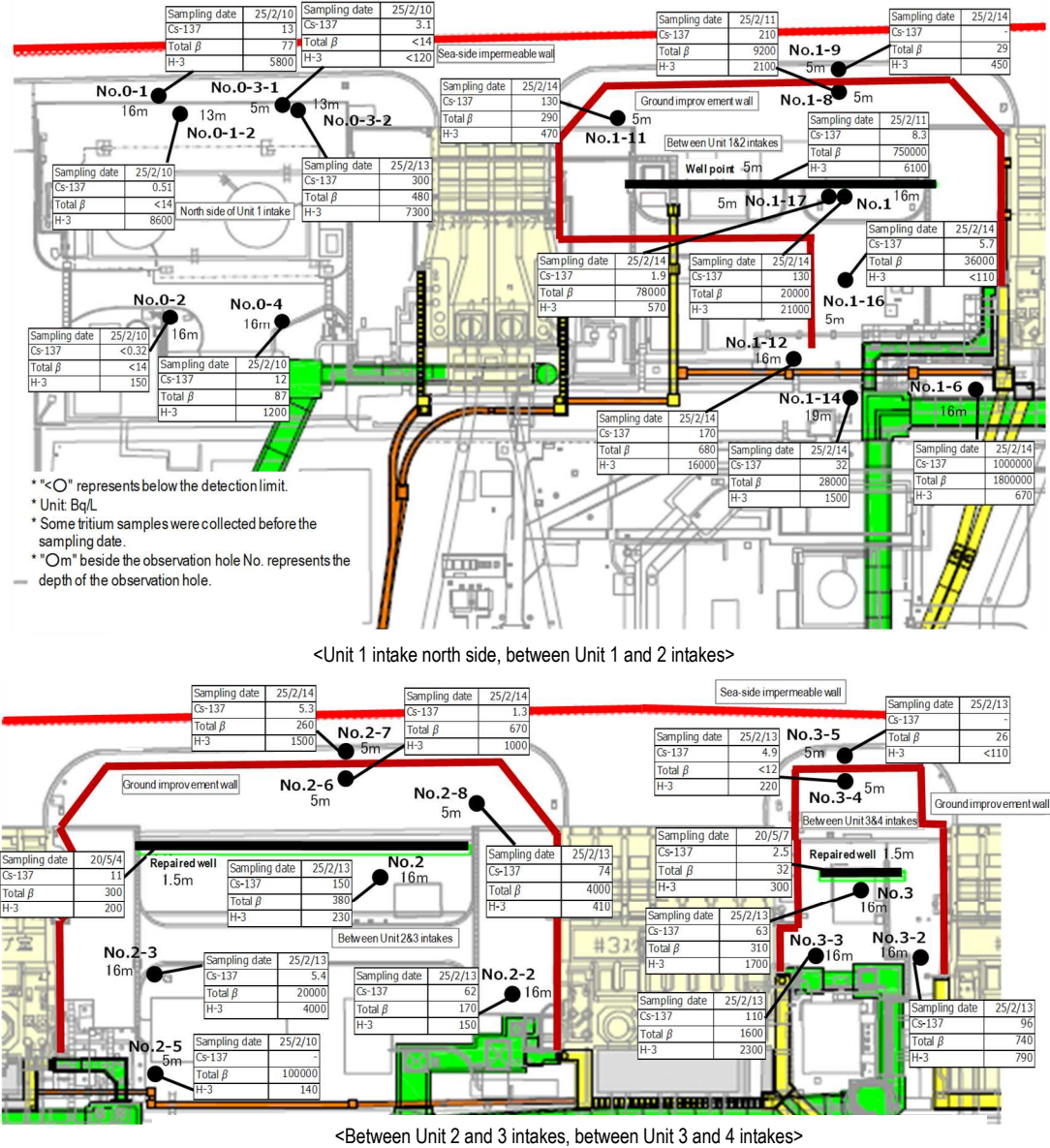


Figure 4: Groundwater concentration on the Turbine Building east side

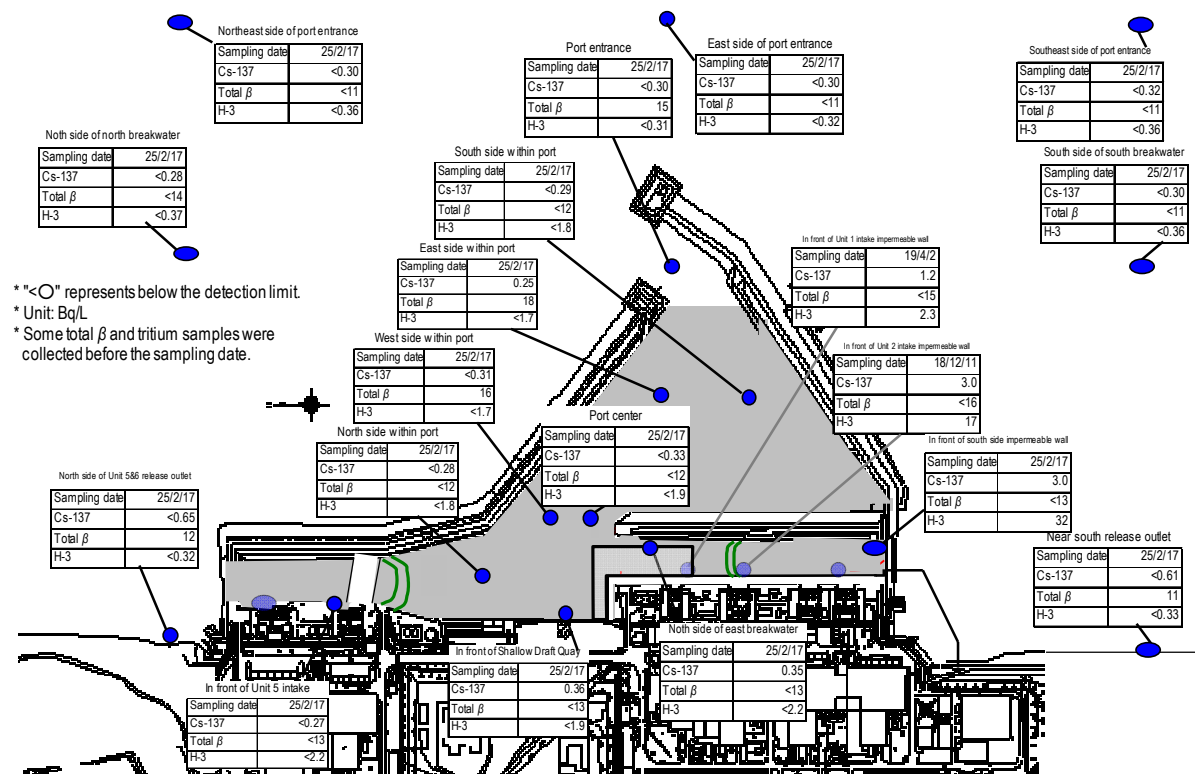


Figure 5: Seawater concentration around the port

Outlook of the number of staff required and efforts to improve the labor environment and conditions

Adequate number of staff will be secured in the long-term, while firmly implementing radiation control of workers. The work environment and labor conditions will be continuously improved by responding to the needs on the site.

➤ Staff management

- The monthly average total of personnel registered for at least one day per month to work on site during the past quarter from October to December 2024 was approx. 9,200 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,900). Accordingly, sufficient personnel were registered to work on site.
- It was confirmed with the prime contractors that the estimated manpower necessary for the work in March 2025 (approx. 4,400 workers per day: cooperating company workers and TEPCO HD employees) would be secured at present. The average numbers of workers per day per month (actual values) for the most recent two years were maintained, at approx. 3,500 to 4,800.
- The number of workers from both within and outside Fukushima Prefecture remained constant. As of January 2025, the local employment ratio (cooperating company workers and TEPCO HD employees) remained constant at around 70%.
- The average exposure doses of workers were approx. 2.51, 2.16 and 2.18 mSv/person-year during FY2021, 2022 and 2023, respectively (The legal exposure dose limits are 100 and 50 mSv/person-year respectively over five years, the TEPCO HD management target is 20 mSv/person-year).
- For most workers, the exposure dose remained sufficiently within the limit and allowed them to continue engaging in radiation work.

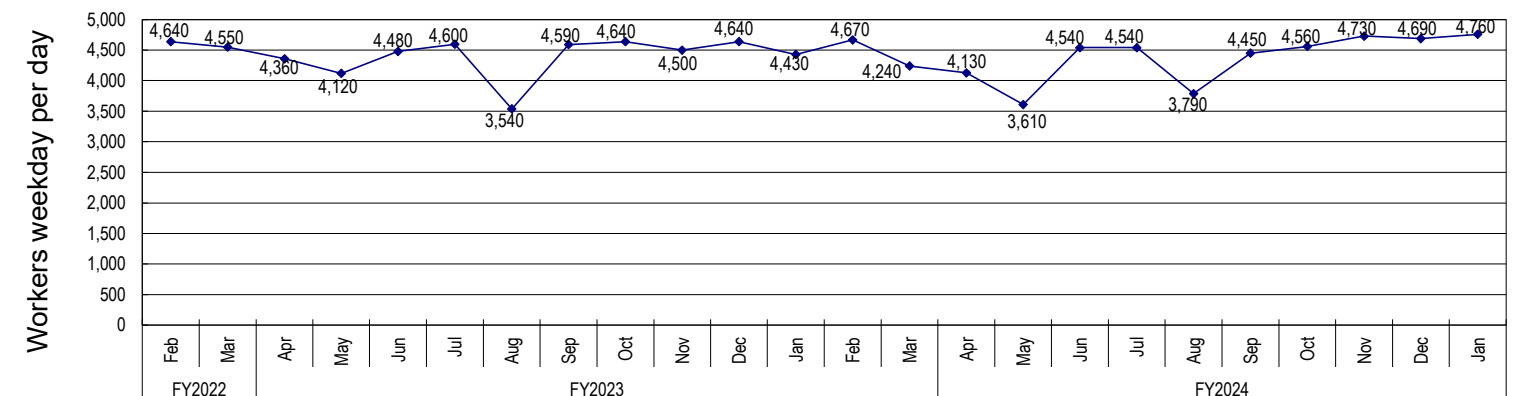


Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

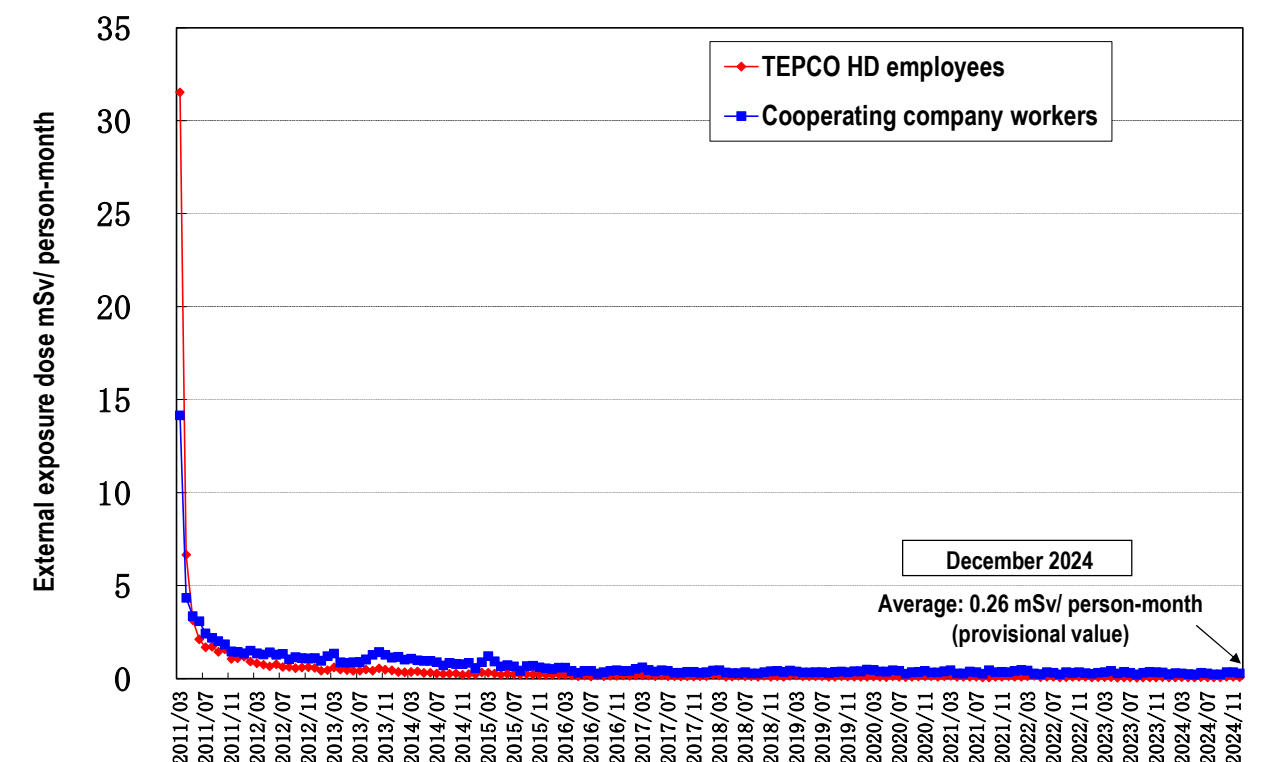


Figure 7: Changes in monthly average exposure dose of individual worker (monthly exposure dose since March 2011)

➤ Countermeasures for infectious diseases

- Countermeasures for various infectious diseases (influenza, norovirus, COVID-19, etc.) depend on personal decisions and basic countermeasures (visiting medical institutions when feeling unwell, ventilation, avoidance of the "Three Cs," frequent handwashing, etc.) being implemented appropriately by each worker and TEPCO proceeds with decommissioning while prioritizing safety.

Others

➤ Permanent restoration measures in response to power outage of Unit 6 high voltage power panel 6C and fire alarm activation

- As measures in response to the power outage of Unit 6 high voltage power panel 6C and fire alarm activation on June 18, 2024, the following are planned: (1) replacing the phase non-splitting busbar on the Unit 6 Turbine Building basement with new cables, (2) confirming the absence of any foreign material contamination, (3) periodical insulation resistance measurement and if a reduction in insulation resistance is confirmed, confirming the cause and recovering the performance.

- Regarding (1) replacing the phase non-splitting busbar on the Unit 6 Turbine Building basement with new cable, as emergency restoration, cables were installed in areas where soot was attached, those where it was difficult to confirm the opening and those where water drops were confirmed during the internal investigation on October 25, 2024 and power was received.
- On February 19, 2025, as permanent restoration, for the phase non-splitting busbar between M/C6A-2 and M/C6C (including parts where cables were installed as emergency restoration), cables were laid in cable trays as a new alternative route and power was received.

Status of seawater monitoring within the port (comparison between the highest values in 2013 and the latest values)

“The highest value” → “the latest value (sampled during January 20 - February 24)”^{*}; unit (Bq/L); ND represents a value below the detection limit

Note: The Total β measurement value is the total radioactivity concentration of radioactive materials that emit β -ray (Potassium-40, Cesium-137, Strontium-90, progeny nuclide Yttrium-90, etc.). In general, approx. 12 Bq/L of natural nuclide Potassium-40 is included in seawater.

Summary of TEPCO data as of February 25, 2025

Cesium-134	: ND(0.33)
Cesium-137	: ND(0.28)
Total β	: ND(14)
Tritium	: ND(1.9)

Cesium-134	: 3.3 (H25/12/24) → ND(0.33)	Below 1/10
Cesium-137	: 7.3 (H25/10/11) → ND(0.33)	Below 1/20
Total β	: 69 (H25/8/19) → ND(14)	Below 1/4
Tritium	: 68 (H25/8/19) → ND(0.31)	Below 1/200

Cesium-134	: 3.3 (H25/10/17) → ND(0.33)	Below 1/10
Cesium-137	: 9 (H25/10/17) → ND(0.38)	Below 1/20
Total β	: 74 (H25/8/19) → ND(13)	Below 1/5
Tritium	: 67 (H25/8/19) → ND(1.7)	Below 1/30

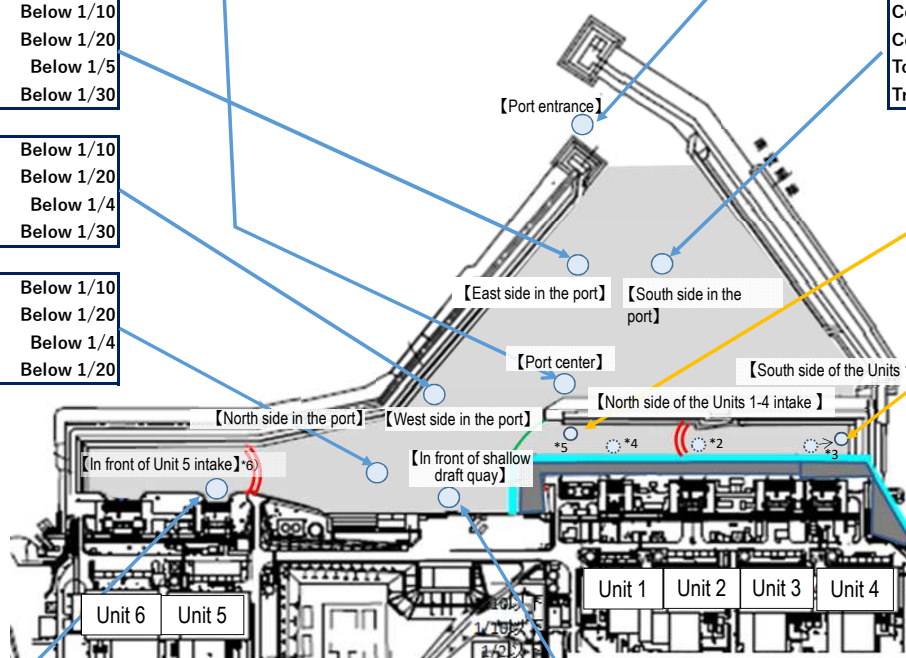
Cesium-134	: 3.5 (H25/10/17) → ND(0.30)	Below 1/10
Cesium-137	: 7.8 (H25/10/17) → ND(0.26)	Below 1/30
Total β	: 79 (H25/8/19) → 16	Below 1/4
Tritium	: 60 (H25/8/19) → ND(1.8)	Below 1/30

Cesium-134	: 4.4 (H25/12/24) → ND(0.24)	Below 1/10
Cesium-137	: 10 (H25/12/24) → ND(0.35)	Below 1/20
Total β	: 60 (H25/7/4) → ND(13)	Below 1/4
Tritium	: 59 (H25/8/19) → ND(1.7)	Below 1/30

Cesium-134	: 32 (H25/10/11) → ND(0.31)	Below 1/100
Cesium-137	: 73 (H25/10/11) → 0.84	Below 1/80
Total β	: 320 (H25/8/12) → 15	Below 1/20
Tritium	: 510 (H25/9/2) → ND(2.2)	Below 1/200

Cesium-134	: 5 (H25/12/2) → ND(0.28)	Below 1/10
Cesium-137	: 8.4 (H25/12/2) → ND(0.29)	Below 1/20
Total β	: 69 (H25/8/19) → 16	Below 1/4
Tritium	: 52 (H25/8/19) → ND(1.8)	Below 1/20

Cesium-134	: ND(0.41)
Cesium-137	: 2.6
Total β	: ND(13)
Tritium	: 32



*1: Monitoring commenced in or after March 2014. Monitoring inside the sea-side impermeable walls was finished because of the landfill.

*2: For the point, monitoring was finished from December 12, 2018 due to preparatory work for transfer of mega float.

*3: For the point, monitoring point was moved from February 6, 2019 due to preparatory work for transfer of mega float. The point was further moved to the outside of the silt fence from January 20, 2023, to install the silt fence to the Drainage Channel K outlet as a measure for fish in the port. (The sampling point was moved to approx. 3m east side)

*4: For the point, monitoring was finished from April 3, 2019 due to preparatory work for transfer of mega float.

*5: For the point, monitoring point was moved to the land side from May 25, 2023 along with work in the surrounding area.

*6: For the point, with the completion of work to install ALPS related facilities and others, monitoring point was moved from "In front of Unit 6 intake" to "In front of Unit 5 intake" from July 3, 2023.

	Legal discharge limit	WHO Guidelines for Drinking Water Quality
Cesium-134	60	10
Cesium-137	90	10
Strontium-90	30	10
Tritium	60,000	10,000

Cesium-134	: 2.8 (H25/12/2) → ND(0.33)	Below 1/8
Cesium-137	: 5.8 (H25/12/2) → ND(0.29)	Below 1/20
Total β	: 46 (H25/8/19) → ND(13)	Below 1/3
Tritium	: 24 (H25/8/19) → ND(2.2)	Below 1/10

Cesium-134	: 5.3 (H25/8/5) → ND(0.34)	Below 1/10
Cesium-137	: 8.6 (H25/8/5) → ND(0.29)	Below 1/20
Total β	: 40 (H25/7/3) → 15	Below 1/2
Tritium	: 340 (H25/6/26) → ND(1.9)	Below 1/100

Source: TEPCO website Analysis results on nuclides of radioactive materials around Fukushima Daiichi Nuclear Power Station <http://www.tepco.co.jp/decommission/planaction/monitoring/index-j.html>

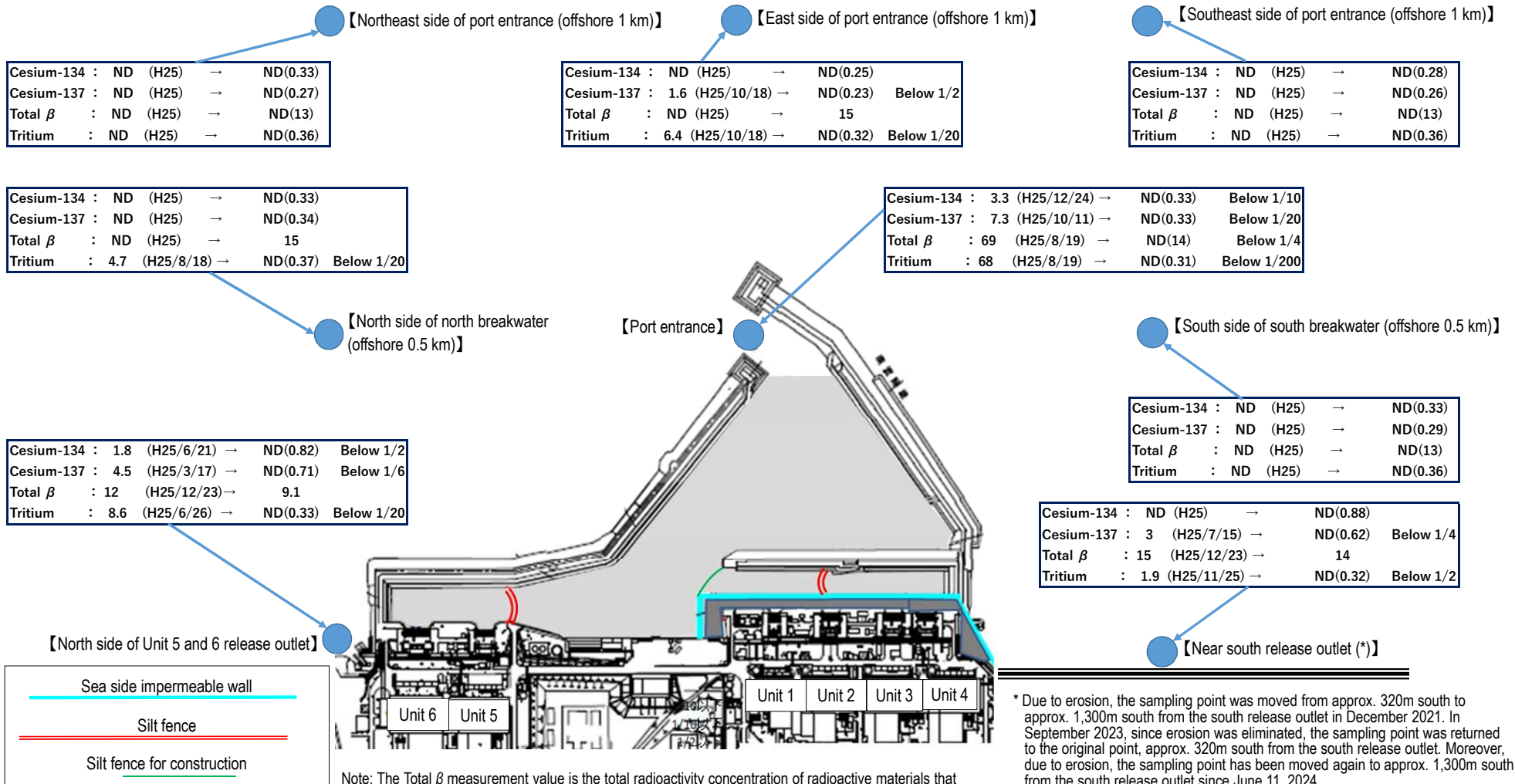
Status of seawater monitoring around outside of the port (comparison between the highest values in 2013 and the latest values)

Unit (Bq/L); ND represents a value below the detection limit; values in () represent the detection limit; ND (2013) represents ND throughout 2013

(The latest values sampled during January 20 - February 24)

Summary of TEPCO data as of February, 2025

	Legal discharge limit	WHO Guidelines for Drinking Water Quality
Cesium-134	60	10
Cesium-137	90	10
Strontium-90	30	10
Tritium	60,000	10,000

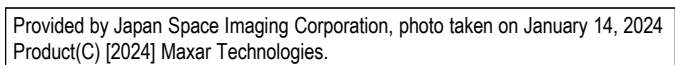


Note: The Total β measurement value is the total radioactivity concentration of radioactive materials that emit β-ray (Potassium-40, Cesium-137, Strontium-90, progeny nuclide Yttrium-90, etc.). In general, approx. 12 Bq/L of natural nuclide Potassium-40 is included in seawater.

* Due to erosion, the sampling point was moved from approx. 320m south to approx. 1,300m south from the south release outlet in December 2021. In September 2023, since erosion was eliminated, the sampling point was returned to the original point, approx. 320m south from the south release outlet. Moreover, due to erosion, the sampling point has been moved again to approx. 1,300m south from the south release outlet since June 11, 2024.

Source: TEPCO website, Analysis results on nuclides of radioactive materials around Fukushima Daiichi Nuclear Power Station <http://www.tepco.co.jp/decommission/planaction/monitoring/index-j.html>

Appendix 2
February 27, 2024



1 Contaminated water management

Milestones of the Mid-and-Long-Term Roadmap (major target processes)

- [Completed] Suppressing the amount of contaminated water generated to 150 m³/day or less (within 2020)
- [Completed] Suppressing the amount of contaminated water generated to 100 m³/day or less (within 2025)
- [Completed] Treatment of stagnant water in buildings was completed* (within 2020) *Except for Units 1-3 Reactor Buildings, Process Main Building and High Temperature Incinerator Building.
- [Completed] Stagnant water in Reactor Buildings was reduced to about a half of the level at the end of 2020 (FY2022-FY2024)

Reference 1/6
February 27, 2025
Secretariat of the Team for
Countermeasures for Decommissioning,
Contaminated Water and Treated Water

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Contaminated water management [Remove]	Contaminated water treatment facility	▽ Reception start of contaminated water to Central Waste Treatment Building ▽ Decontamination equipment (AREVA) ▽ Evaporative concentration equipment ▽ Cesium Adsorption Apparatus (KURION) ▽ 2nd Cesium Adsorption Apparatus (SARRY)		Cesium Adsorption Apparatus (KURION) 		▽ Treatment of RO-concentrated salt water complete ▽ Reduction of strontium by Cesium Adsorption Apparatus (KURION) (from 2015.1.6) ▽ Reduction of strontium by 2nd Cesium Adsorption Apparatus (SARRY) (from 2014.12.26)				▽ Purification of strontium-reduced water in flanged tanks complete	▽ Purification of strontium-reduced water complete				
	Removal of contaminated water from seawater pipe trench	Landing of the second Cesium Adsorption Apparatus (SARRY) 		Multi-nuclide removal system (ALPS) 	▽ Multi-nuclide Removal System (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted) ▽ Multi-nuclide Removal System (additional ALPS) ▽ Multi-nuclide Removal System (high performance ALPS) (from 2014.10.18, hot tests conducted)		▽ Completion of tunnel filling ▽ Transfer of stagnant water complete ▽ Completion of tunnel filling (except for upper part of Shaft D) ▽ Completion of shaft filling ▽ Filling of openings II and III complete ▽ Transfer stagnant water complete ▽ Completion of filling parts running over drainage channel	▽ Completion of shaft filling ▽ Completion of shaft filling	Unit 2 seawater pipe trench Shaft D filling work 						
Contaminated water management [Redirect]	Groundwater bypass		▽ Installation start of groundwater bypass		▽ Operation start of groundwater bypass (drainage started from 2014.5.21)										
	Sub-drain		▽ Recovery of existing subdrain pit and start of new installation ▽ Installation start of Water-Treatment Facility special for Subdrain & Groundwater drains			▽ Operation start of subdrain (drainage started from 2015.9.14) (Treatment capacity: 1000 m ³ /day)			▽ Enhancement of treatment capacity (2000m ³ /day)						
	Land-side impermeable wall			▽ Installation start of land-side impermeable walls		▽ Freezing start		▽ Start of maintenance operation on north and south sides Start of maintenance operation on east side	▽ Freezing completion (except for some parts)		In some temperature measurement tubes near the K drainage channel cross, temperature exceeded 0°C locally				
	Facing	Subdrain purification system 		Land-side impermeable wall brine (refrigerant) circulation pipe 		▽ Completion of waterproof pavement (facing) (except for areas of 2.5 and 6.5m above sea level and around Unit 1-4) ▽ Completion					▽ Completion of waterproof pavement (facing) (except for around Unit 1-4)				
Contaminated water management [Retain]	Bank groundwater measures		▽ Installation start of seaside impermeable walls		▽ Installation of seaside impermeable walls complete ▽ Operation start of groundwater drain (pumping-up started on 2015.11.5)				Placement of seaside impermeable walls complete 						
	Storage facility	▽ Storage in steel square tanks ▽ Storage in flanged cylindrical tanks ▽ Water leakage (10L) from flanged tank		▽ Water leakage (300L) from flanged tank ▽ Water leakage (100L) from flanged tank ▽ Completion of fence to prevent leakage expanding ▽ Work to raise fence height complete		▽ Completion of purification treatment of RO concentrated salt water ▽ Completion of replacement of steel square tanks				▽ Purification of strontium-reduced water in flanged tanks complete ▽ Transfer and storage of all treated water in welded-joint tanks					
				▽ Leakage of contaminated water from underground reservoir => Start of transfer to tanks ▽ Transfer of contaminated water to tanks complete ▽ Storage in cylindrical steel welded-joint tanks				Construction of welded-joint tanks 			▽ Purification of strontium-reduced water complete Flanged and welded-joint tanks 				
Treatment of stagnant water		▽ Installation of stagnant water transfer equipment/transfer start		▽ Completion of work to improve reliability of transfer line (replacement with PE pipes)		▽ Start to maintain water-level difference with subdrain water level ▽ Transfer start from each building to Central R/W Building		▽ Floor exposure of Unit 1 TB	▽ Separation of stagnant water between Units 1 and 2 ▽ Floor exposure of Unit 1 R/WB		▽ Floor exposure of Unit 2 TB, R/WB ▽ Floor exposure of Unit 3 TB, R/WB ▽ Floor exposure of Unit 4 R/B, TB, R/WB		▽ Completed lowering to target water level of Unit 2 R/B ▽ Completed lowering to target water level of Unit 1, 3 R/B		
Countermeasures to tsunami	Closure of openings		▽ Examination start of measures to close building openings ▽ Work for common pool complete		▽ Work for Units 1 and 2 TB complete ▽ Work for HTI building complete				▽ Work for Process Main Building complete ▽ Work for Unit 3 TB complete		▽ Work for Unit 1-3 R/B complete		▽ Measures to close openings were completed ▽ Work for Units 1-4 R/WB was completed		
	Seawall	▽ Installation of outer-rise tsunami seawall complete								▽ Construction start of Chishima Trench Tsunami Seawall ▽ Completion of installation	Japan Trench tsunami seawall ▽ On-site start		Japan Trench Tsunami Seawall Completion of main wall construction		
	Mega Road							▽ Start of marine construction Temporary grounding of mega float			▽ Internal filling complete (reduction of tsunami risks)				

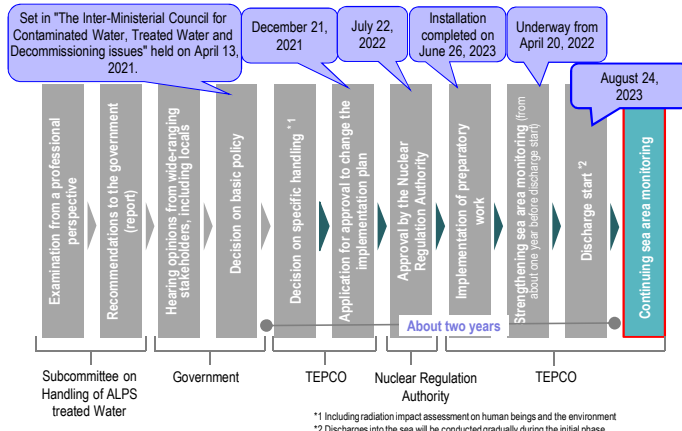
Chishima Trench Tsunami Seawall complete

Japan Trench Tsunami Seawall Main seawall

2 Handling of ALPS treated water

In "The Inter-Ministerial Council for Contaminated Water, Treated water and Decommissioning issues" held on April 13, 2021, the basic policy on how to handle ALPS treated water was set. Based on this, the response of TEPCO was announced on April 16.

Regarding the discharge of ALPS treated water into the sea, TEPCO must comply with regulatory and other safety-related standards to ensure the safety of the public, surrounding environment and agricultural, forestry and fishery products. To minimize adverse impacts on reputation, monitoring will be further enhanced, objectivity and transparency ensured by engaging with third-party experts and safety checked by the IAEA. Moreover, accurate information will be disseminated continuously and in a highly transparent manner.



Information provision and communication to foster understanding

- Occasions to deepen the understanding are organized by communications related to decommission via various media and visit to the power station.



- On the dedicated website "Treated Water Portal Site" (Japanese, English, Chinese and Korean) within the TEPCO website, monitoring results of radioactive materials are published timely.
- Visit and dialogue meeting of Fukushima Daiichi Nuclear Power Station have been held since 2019 for 13 cities, towns and villages.
- Through various opportunities such as visit and on-site explanations, communications continue where opinions of related parties are heard, their thought is taken seriously, and TEPCO conveys its efforts, thought and countermeasures for reputational damage.

Examination concerning handling of ALPS treated water

Tritiated Water Taskforce (2013.12 – 2016.5, 15 meetings)



Tank area viewed from the Large Rest House (2015.10.29)

2016.6 Report of Tritiated Water Taskforce

Subcommittee on Handling of ALPS treated water (2016.11 – 2020.1, 17 meetings)

2018.8 Explanatory and hearing meeting, receiving opinions

2020.2 Report of Subcommittee on Handling of ALPS treated water

2021.4.13 The basic policy on the handling of ALPS treated water was set
2021.4.16 The response of TEPCO was announced

Opportunity for receiving opinions from parties concerned concerning handling of ALPS treated water (2020.4 – 2020.10, 7 meetings)

Review meeting concerning the implementation plan on handling of ALPS treated water (2021.7 – 2022.4, 15 meetings)

2022.4.28, 5.13, 7.15

Application to partially revise the Application Documents for Approval to Amend the Implementation Plan was submitted

2022.7.22 Application for the Application Documents for Approval to Amend the Implementation Plan was approved

2022.8.4 Work has commenced

2023.2.14, 20 Application for the Application Documents for Approval to Amend the Implementation Plan was submitted (amendment of organizational structure, and nuclides to be measured and assessed, and others)

2023.8.24 Commencement of discharge

2023.6.26 Completion of installation
2023.7.7 Receipt of Certificate of Completion for Inspection Prior to Use

2022.11.14 Application for the Application Documents for Approval to Amend the Implementation Plan was submitted (amendment of organizational structure, and nuclides to be measured and assessed, and others)

● Status of discharge of ALPS treated water into the sea

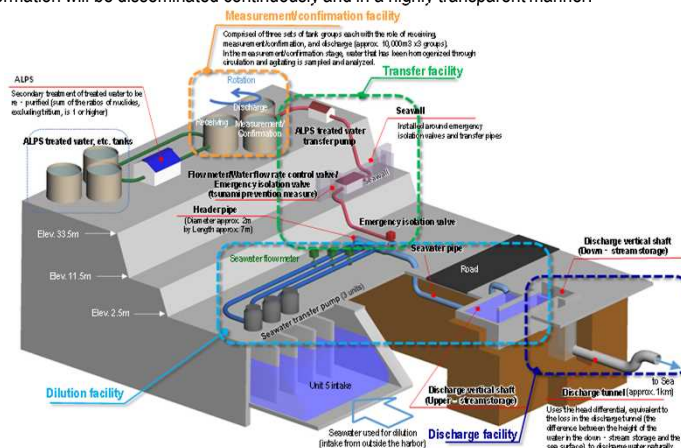
Discharge of ALPS treated water into the sea commenced from August 24, 2023, and the 1st discharge was completed on September 11.

During the discharge period, no abnormality was detected by the sea area monitoring conducted by the national government, Fukushima Prefecture and TEPCO.

<Discharges in FY2024>

Tank group discharged	Tank Group C	Tank Group A	Tank Group B	Tank Group C
Tritium concentration	190,000 Bq/L	170,000 Bq/L	170,000 Bq/L	200,000 Bq/L
Discharge commencement	April 19, 2024	May 17, 2024	June 28, 2024	August 7, 2024
Discharge termination	May 7, 2024	June 4, 2024	July 16, 2024	August 25, 2024
Discharge amount	7,851 m ³	7,892 m ³	7,846 m ³	7,897 m ³
Total tritium amount	Approx. 1.5 trillion Bq	Approx. 1.3 trillion Bq	Approx. 1.3 trillion Bq	Approx. 1.6 trillion Bq

Tank group discharged	Tank Group A	Tank Group B
Tritium concentration	280,000 Bq/L	310,000 Bq/L
Discharge commencement	September 26, 2024	October 17, 2024
Discharge termination	October 14, 2024	November 4, 2024
Discharge amount	7,817 m ³	7,837 m ³
Total tritium amount	Approx. 2.2 trillion Bq	Approx. 2.4 trillion Bq



● Rearing test of marine organisms

- To alleviate concerns and lead to relief of local residents, related parties and the everyone in society, marine organisms are being reared in tanks of seawater containing ALPS treated water and the status is compared with the original seawater controls.
- External experts also confirmed that there was no difference in rearing statuses between the tanks of the original seawater controls and those of seawater containing ALPS treated water.
- As shown in the existing research results conducted in Japan and overseas, it was confirmed that "tritium in vivo reached equilibrium in a certain time period and the concentration of tritium in vivo reaching equilibrium did not exceed the level in the growing environment."



Flounder in the pool of the Marine Organisms Rearing Facility



Pool of the Marine Organisms Rearing Facility

- Daily rearing status is published in the TEPCO website and Twitter
 - TEPCO website: <http://www.tepco.co.jp/decommission/information/newsrelease/readingtest/index-j.html>
 - TEPCO X (Old Twitter): <https://twitter.com/TEPCOfishkeeper>



● Publication of the Comprehensive Report of the IAEA safety review

The Comprehensive Report on the safety review concerning handling of ALPS -treated water was published by the IAEA on July 4, 2023.

In the Executive Summary of the IAEA Comprehensive Report, the IAEA concluded the following: (1) the activities by Japan associated with the discharge of ALPS treated water into the sea are consistent with relevant international safety standards, (2) the discharge of the ALPS treated water will have a negligible radiological impact on people and the environment.

We will continue to share necessary information with the IAEA, while striving to foster further understanding of the international community about the discharge of ALPS treated water into the sea.

<https://www.iaea.org/topics/response/fukushima-daiichi-alps-treated-water-discharge-comprehensive-reports>



3 Removal of fuel from spent pool

Milestones of the Mid- and Long-Term Roadmap (major target processes)

- Completion of Units 1-6 fuel removal (within 2031)
- Completion of installation of Unit 1 large cover (around FY2023), start of Unit 1 fuel removal (FY2027-2028)
- Start of Unit 2 fuel removal (FY2024-2026)

Reference 3/6
February 27, 2025
Secretariat of the Team for
Countermeasures for Decommissioning,
Contaminated Water and Treated Water

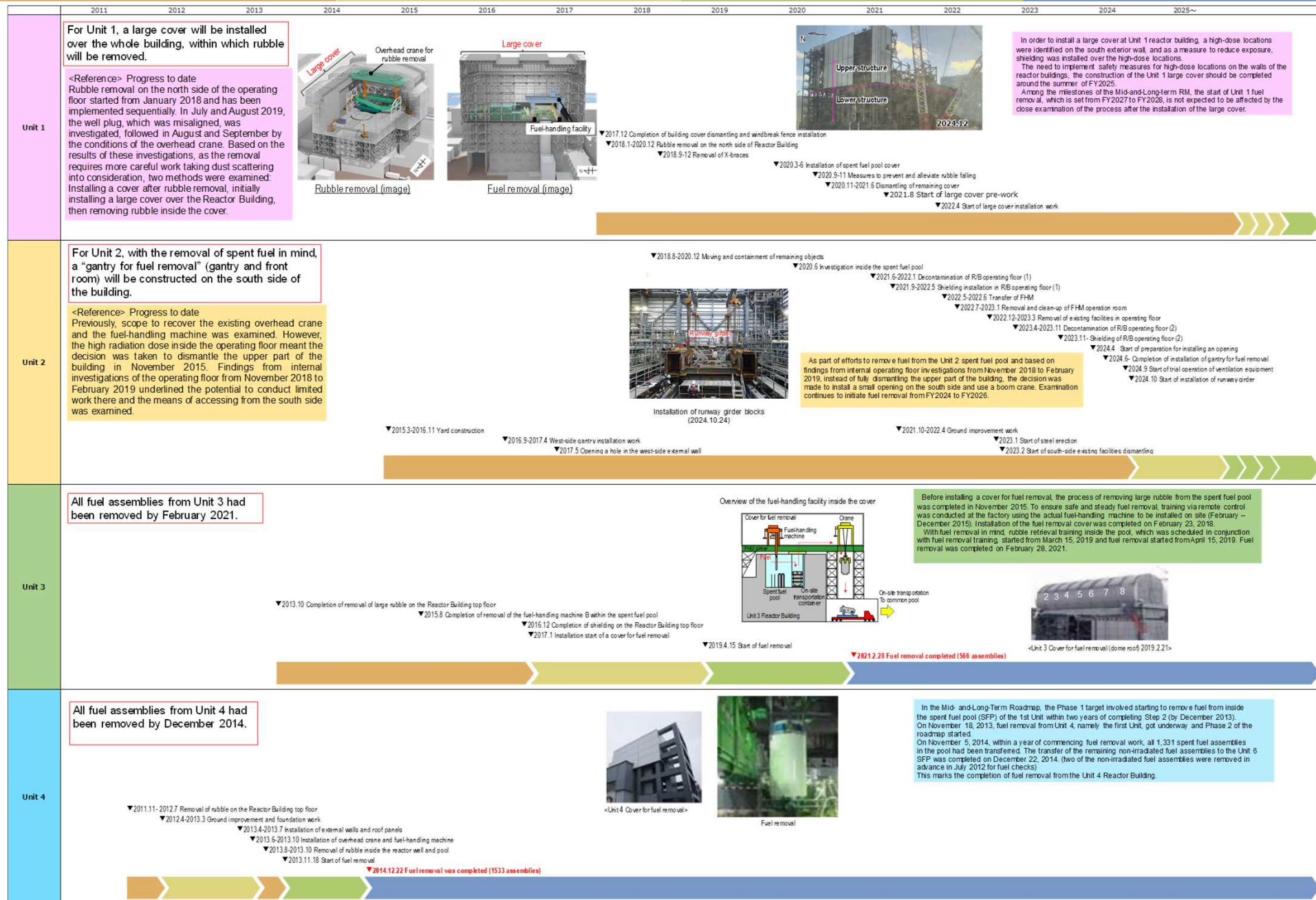
Legend

Rubble removal, etc.

Installing a fuel removal machine

Fuel removal

Storage and handling of fuel



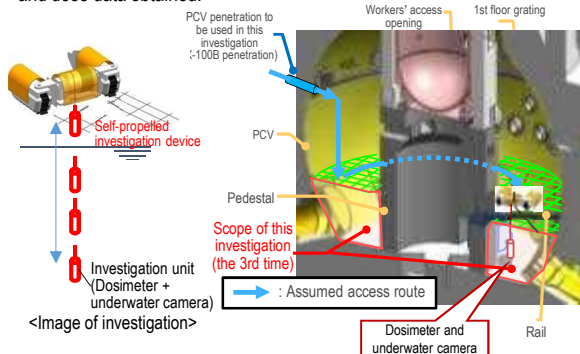
Milestones of the Mid-and-Long-Term Roadmap (major target processes)

Commencement of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (From September 10, 2024, trial fuel debris retrieval commenced)

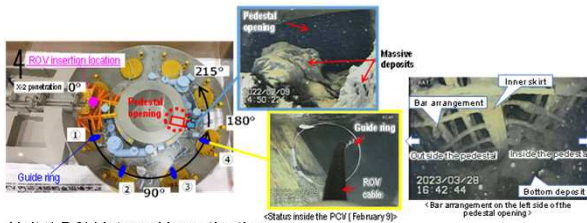
Before removing fuel debris, investigations inside the Primary Containment Vessel (PCV) are conducted to inspect the conditions there, including locations of fuel debris.

Unit 1 Investigation overview

- In April 2015, a device having entered the inside of the PCV via a narrow opening (bore:φ100 mm) collected information such as images and airborne dose inside the PCV 1st floor.
- In March 2017, an investigation using a self-propelled investigation device was conducted to inspect the spreading of debris to the basement floor outside the pedestal, with images taken of the PCV bottom status for the first time. The conditions inside the PCV will continue to be examined, based on the imagery and dose data obtained.



In February 2022, "the guide ring" was installed to facilitate the investigation. From March 28, 2023, the investigation inside the pedestal by ROV-A2 started and confirmed that a portion of the bar arrangement was exposed. Regarding the soundness of the pedestal, based on the past earthquake resistant evaluation by the International Research Institute for Nuclear Decommissioning (IRID), it was evaluated that even though a portion of the pedestal was lost, there would be no serious risk. However, as the present information is very limited, the investigation will continue to acquire as much information as possible for continued evaluation.



Unit 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	<ul style="list-style-type: none">- Acquiring images- Measuring the air temperature and dose rate- Measuring the water level and temperature- Sampling stagnant water- Installing permanent monitoring instrumentation
	2nd (2015.4)	<ul style="list-style-type: none">- Confirming the status of the PCV 1st floor- Acquiring images- Measuring the air temperature and dose rate- Replacing permanent monitoring instrumentation
	3rd (2017.3)	<ul style="list-style-type: none">- Confirming the status of the PCV 1st basement floor- Acquiring images- Measuring the dose rate- Sampling deposit- Replacing permanent monitoring instrumentation
	4th (From 2022.2)	<ul style="list-style-type: none">- Acquiring information inside PCV (inside/outside of the pedestal)- Acquiring images- Measuring deposit thickness and sampling deposit- Detecting deposit debris, 3D mapping
Leakage points from PCV	<ul style="list-style-type: none">- PCV vent pipe vacuum break line bellows (identified in 2014.5)- Sand cushion drain line (identified in 2013.11)	
<u>Evaluation of the location of fuel debris inside the reactor by measurement using muons</u> Confirmed that there was no large fuel in the reactor core. (2015.2-5)		

Unit 2 Investigation overview

- In January 2017, a camera was inserted from the PCV penetration to inspect the conditions of the rail on which the robot traveled. The results of a series of investigations confirmed some gratings had fallen and deformed as well as a quantity of deposit inside the pedestal.
- In January 2018, the conditions below the platform inside the pedestal were investigated. Based on the analytical results of images obtained in the investigation, deposits, probably including fuel debris, were found at the bottom of the pedestal. Moreover, multiple parts exceeding the surrounding deposits were also detected. We presumed that there were multiple instances of fuel debris falling.
- In February 2019, an investigation touching the deposits at the bottom of the pedestal and on the platform was conducted and confirmed that the pebble-shaped deposits, etc. could be moved and that hard rock-like deposits that could not be gripped may exist.



- In October 2020, deposits contact investigation the PCV penetration (X-6 penetration) was conducted. This confirmed that deposits inside the penetration had not deformed and come unstuck.



- From September 10, 2024, the end tool of the telescopic equipment passed through the isolation valve, and the trial fuel debris retrieval commenced. On October 30, fuel debris was gripped with the end tool. On November 2, the guide pipe was pulled off, and the telescopic equipment was stored in the enclosure. On November 7, fuel debris was carried out from the hatch on a side of the enclosure, and the trial retrieval was completed.

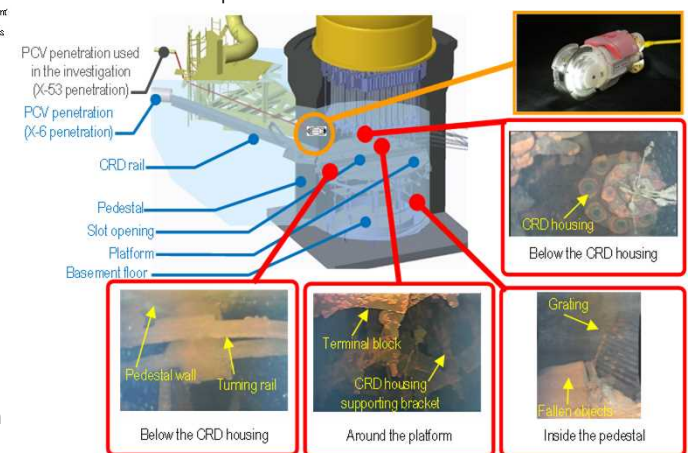
Unit 2 PCV internal investigation

Investigations inside the PCV	1st (2012.1)	- Acquiring images - Measuring the air temperature
	2nd (2012.3)	- Confirming water surface - Measuring the water temperature - Measuring the dose rate
	3rd (2013.2 – 2014.6)	- Acquiring images - Sampling stagnant water - Measuring water level - Installing permanent monitoring instrumentation
	4th (2017.1-2)	- Acquiring images - Measuring the dose rate - Measuring the air temperature
	5th (2018.1)	- Acquiring images - Measuring the dose rate - Measuring the air temperature
	6th (2019.2)	- Acquiring images - Measuring the dose rate - Measuring the air temperature - Determining characteristics of a portion of deposit
Leakage points from PCV	- No leakage from the torus chamber rooftop - No leakage from any internal/external surfaces of S/C	
<u>Evaluation of the location of fuel debris inside the reactor by measurement using muons</u> The existence of high-density materials, which were considered to constitute fuel debris, was confirmed at the bottom of RPV and in the lower part and outer periphery of the reactor core. It was assumed that a significant portion of fuel debris existed at the bottom of RPV. (2016.3-7)		

Unit 3 Investigation overview

- In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, was investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.
- In October 2015, to confirm the conditions inside the PCV, an investigative device was inserted into the PCV from X-53 penetration to obtain images, data on dosage and temperature and sample stagnant water. No damage to the structure and walls inside the PCV was identified and the water level was almost identical to estimated values. In addition, the dose inside the PCV was confirmed to be lower than in other Units.
- In July 2017, the inside of the PCV was investigated using the underwater ROV (remotely operated underwater vehicle) to inspect the inside of the pedestal. Analysis of the imagery obtained in the investigation identified damage to multiple structures and the supposed core internals.
- Videos obtained in the investigation were reproduced in 3D. Based on the reproduced images, the relative positions of the structures, such as the rotating platform slipping off the rail with a portion buried in deposits, were visually understood.

<Conditions inside the pedestal>

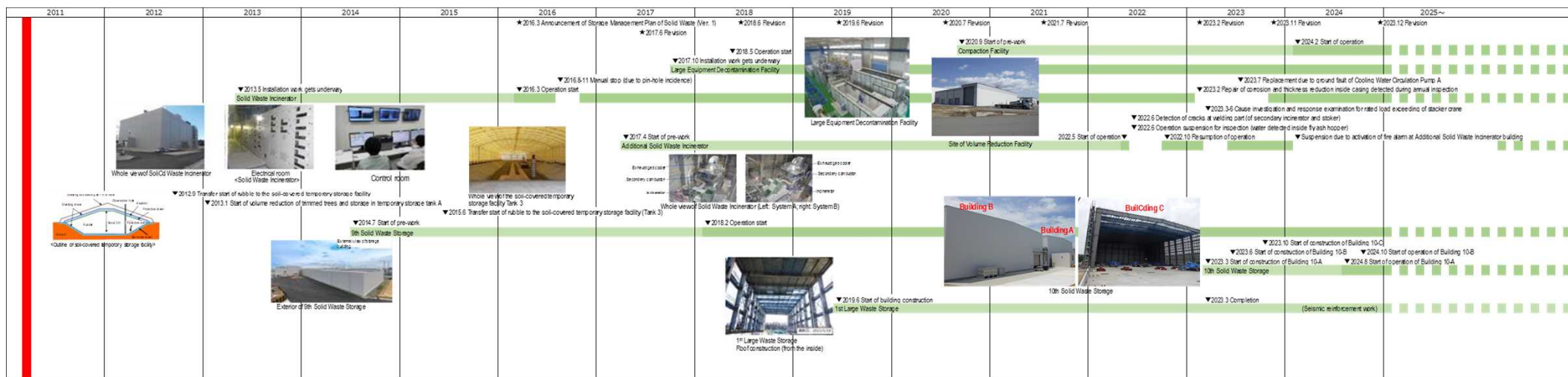


Unit 3 PCV internal investigation

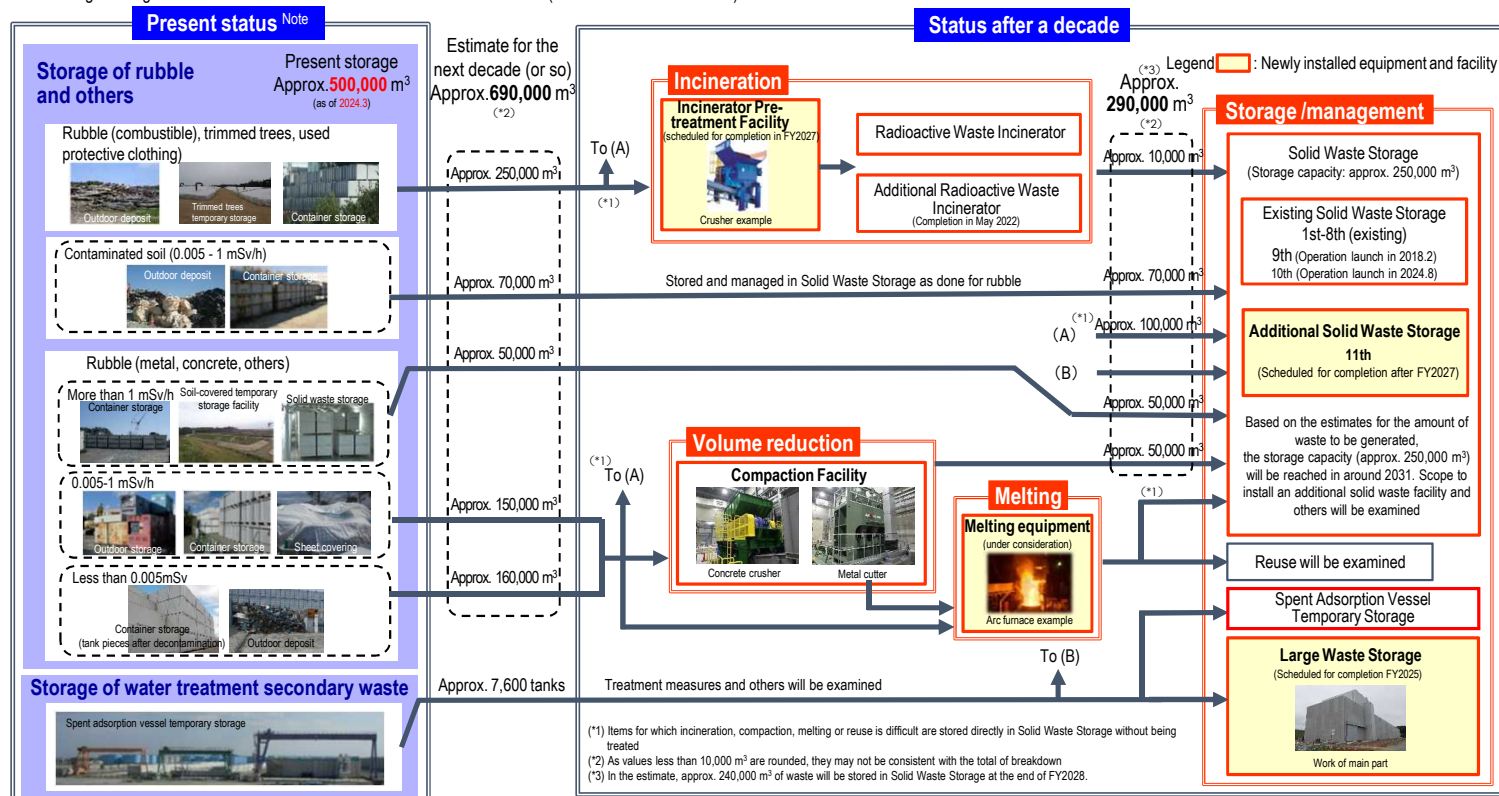
Investigations inside the PCV	1st (2015.10-12)	<ul style="list-style-type: none">- Acquiring images- Measuring the air temperature and dose rate- Measuring the water level and temperature- Sampling stagnant water- Installing permanent monitoring instrumentation (2015.12)
	2nd (2017.7)	<ul style="list-style-type: none">- Acquiring images- Installing permanent monitoring instrumentation (2017.8)
Leakage points from PCV	- Main steam pipe bellows (identified in 2014.5)	
Evaluation of the location of fuel debris inside the reactor by measurement using muons The evaluation confirmed that no large lump existed in the core area where fuel had been placed and that a portion of the fuel debris potentially existed at the bottom of the RPV. (2017.5-9)		

Milestones of the Mid-and-Long-Term Roadmap (major target processes)

Eliminating temporary outdoor storage of rubble and others * Except for secondary waste of water treatment and materials for reuse or recycling (within FY2028)



Solid Waste Storage Management Plan for the Fukushima Daiichi Nuclear Power Station (Revision in December 2024)



- The exposure dose at the site boundaries will be reduced by aggregation to indoor storage and eliminating outdoor storage.
- The exposure dosage in exhaust gas from incinerators and at site boundaries is measured and announced on the website and others.

While ensuring reliable exposure dose management for workers, sufficient personnel are secured. Moreover, while getting a handle on on-site needs, the work environment and labor conditions are continuously improved.

Regarding the site-wide reduction in the radiation dose and prevention of contamination spreading, the radiation dose on site was reduced by removal of rubble, topsoil and facing. Moreover, the operation was improved to use environmentally-improved areas as a Green Zone, within which workers are allowed to wear general work clothes and disposable dust-protective masks which are less of a physical burden.

