Outline of Decommissioning, Contaminated Water and Treated Water Management

November 28, 2024
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

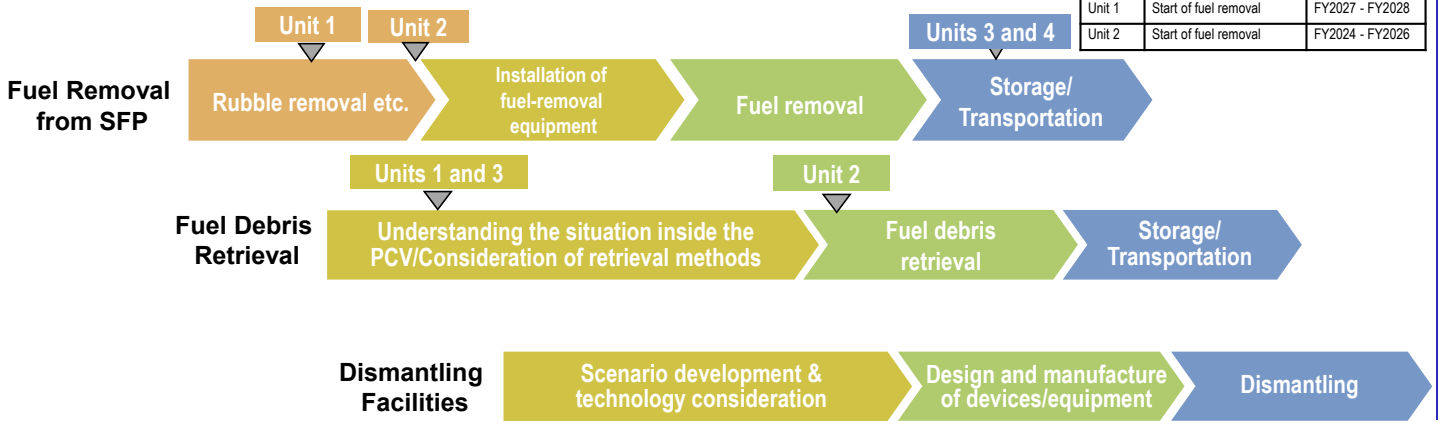
Main decommissioning work and steps

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 1-6	Completion of fuel removal	Within 2031
Unit 1	Start of fuel removal	FY2027 - FY2028
Unit 2	Start of fuel removal	FY2024 - FY2026

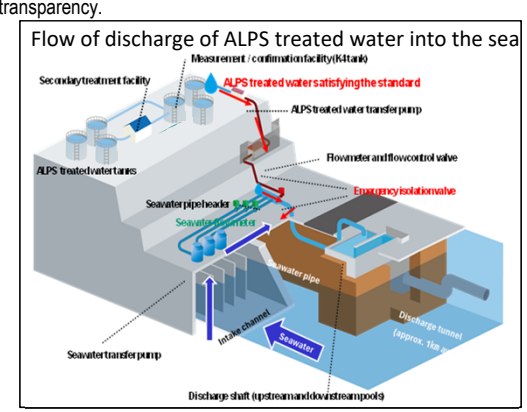


Measures for treated water

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.

Flow of discharge of ALPS treated water into the sea



Contaminated water management - triple-pronged efforts -

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

① "Remove" the source of water contamination ② "Redirect" fresh water from contaminated areas ③ "Retain" contaminated water from leakage

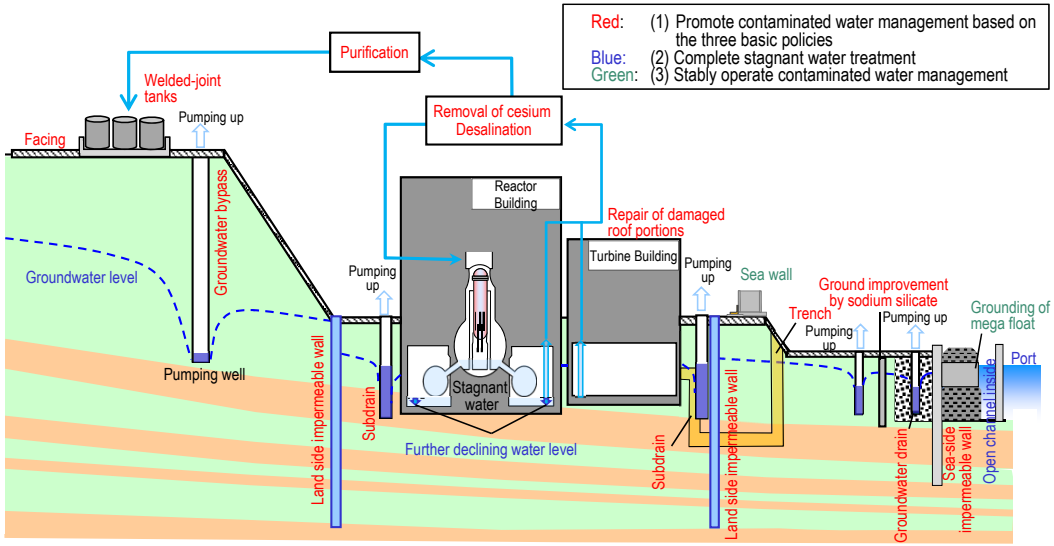
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal system) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and subdrains, have stabilized 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 m^3/day (in May 2014) before implementing measures to approx. 80 m^3/day (in FY2023), achieving the milestone of "suppressing the amount of contaminated water generated to 100 m^3/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 m^3/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 Unit 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 and Future Challenges of the Mid-and-Long-Term Roadmap toward Decommissioning of TEPCO Holdings Fukushima Daiichi Nuclear Power Station (Outline)

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.

Unit 2 Progress of trial fuel debris retrieval

On November 7, Unit 2 trial fuel debris retrieval using the telescopic device was completed.

Sampled fuel debris was transported to the Japan Atomic Energy Agency (JAEA) Oarai Nuclear Engineering Institute on November 12.

The transported fuel debris will be analyzed over a period of several months to approximately one year and the data acquired will be leveraged to determine fuel debris retrieval methods, safety measures and storage methods to be implemented in future.

<Off-site transportation cask mounted on the off-site transportation vehicle>

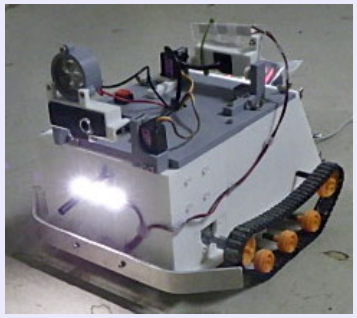
Unit 1 Results of the in-house accessibility survey in the vicinity of X-25 penetration

To clarify the accident progression and develop plans for environmental improvement inside the reactor buildings, investigations of the Units 1-3 Reactor Buildings have been underway.

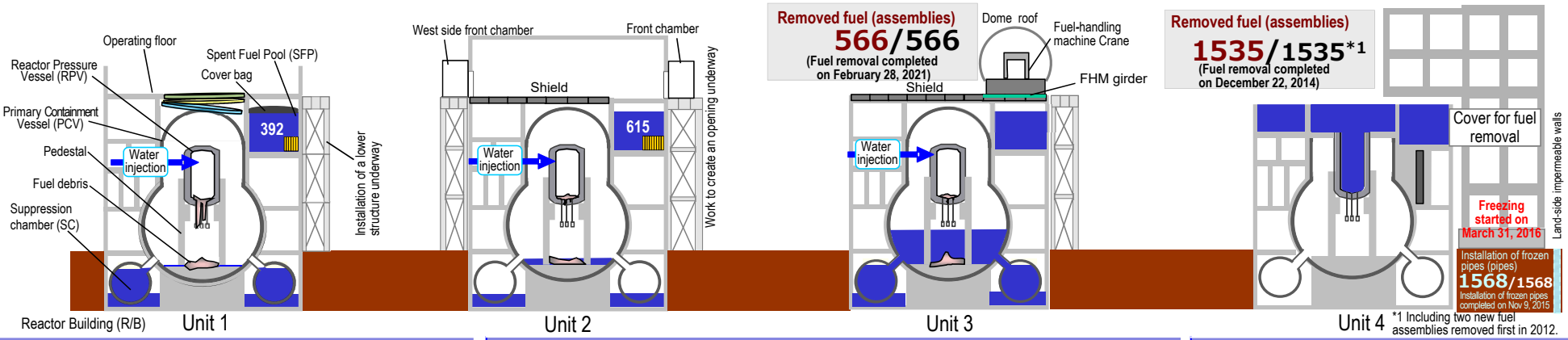
In FY2021, high dose rates were detected in the vicinity of the Unit 1 X-25 penetration (near the shielding blocks).

As preliminary confirmation before investigating inside the shielding blocks, where high dose rates were detected, accessibility was confirmed using an in-house crawler robot on November 19, and no structures hindering drone flight were identified.

Going forward, consideration and preparations will be made for the investigation in the vicinity of the X-25 penetration using a combination of crawler robots and drones.



<In-house crawler robot>



Discharge of ALPS treated water into the sea

The discharge of ALPS treated water from the measurement/confirmation facility Tank Group B was completed on November 4.

The measurement/confirmation facility is currently being inspected based on the conservation plan and the inspection of Tank Group C. The inspection inside Tank Group C detected paint peeling, slight rust and other damage at the tank bottom, but it was confirmed that they would have no impact on the soundness of tanks. Accordingly, repair painting was applied.

In preparation for the 7th discharge of ALPS treated water in FY2024, transfer to Tank Group C commenced from November 27.

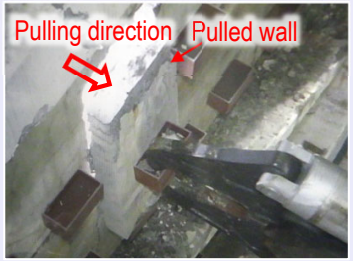
Regarding tritium in seawater, TEPCO will continue confirming that it is being discharged safely as planned, while meeting the discharge requirement based on quick daily analyses.

Unit 2 Progress toward fuel removal

Before installing the fuel-removal system, work to create an opening on the south side of the Unit 2 Reactor Building operating floor is underway. Work to pull down the wall commenced from November 23.

Moreover, work to install runway garter steel frames commenced from October 24, which involved carrying three of eight blocks into the south side gantry.

At Units 4 and 3, from which fuel was removed previously, a decline in visibility was detected. To secure visibility during fuel-removal work, purification equipment will be installed in the pool in around the first half of 2025.



<Work to pull down the wall>

Unit 2 Cause, countermeasures and future response to water level decline in the Spent Fuel Pool Skimmer Surge Tank

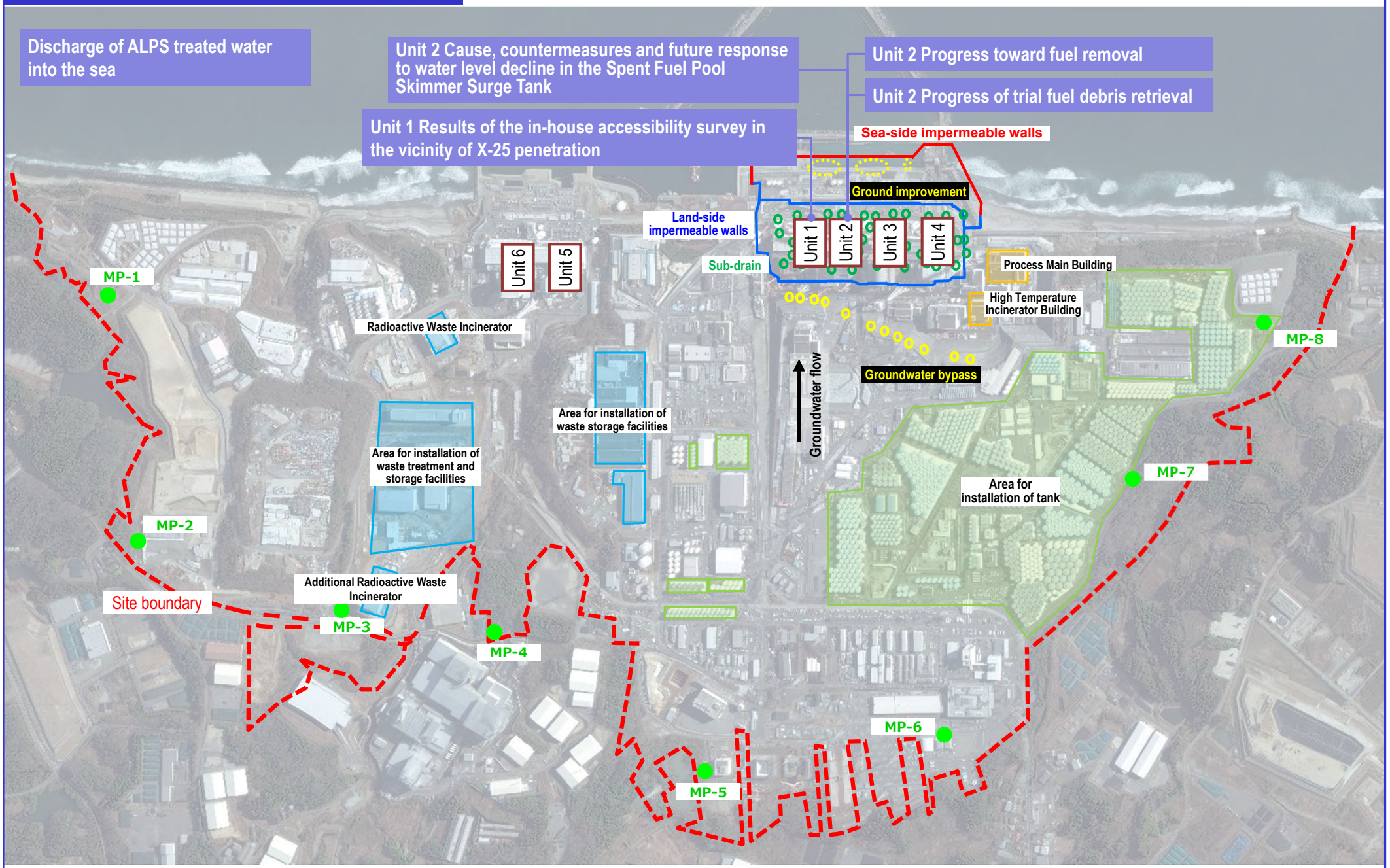
Work to construct the alternative cooling line and repair of leakage parts were completed on November 14.

An investigation into similar parts (dissimilar material joints) detected corrosion in three other portions, which were then repaired.

To resume circulating cooling, work to clean inside the pipes and trial operation were conducted. After confirming the soundness of the pipes, circulating cooling by the Unit 2 Spent Fuel Pool Primary Cooling System resumed from November 25.

As measures to similar parts of other Units, while prioritizing Unit 1 where fuel remains, an investigation into dissimilar material joints will be implemented.

Major initiatives – Locations on site

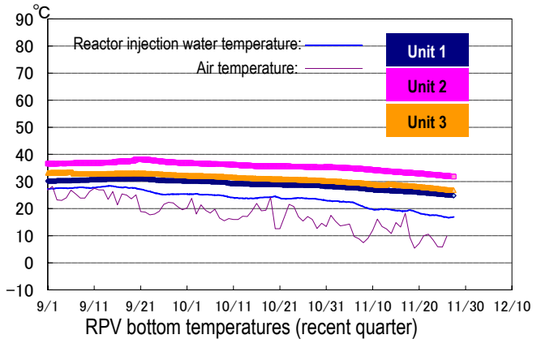


Provided by Japan Space Imaging Corp., photo taken on January 14, 2024
Product (C) [2024] Maxar Technologies.

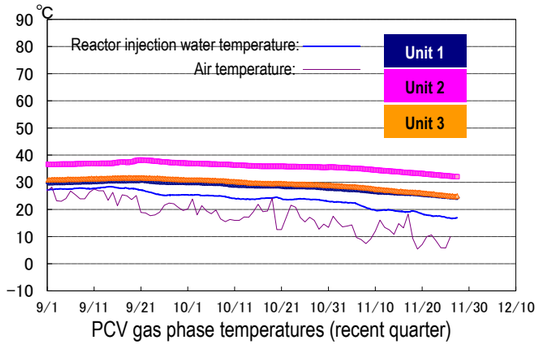
I. Confirmation of the reactor conditions

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 it varied depending on the unit and location of the thermometer.

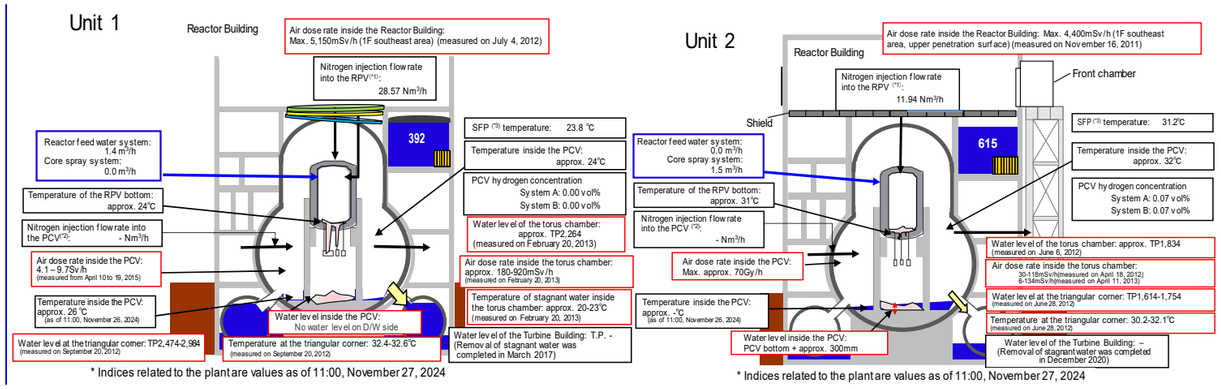


RPV bottom temperatures (recent quarter)

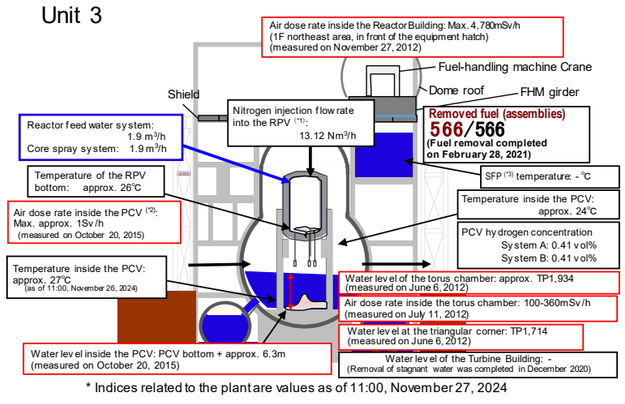


PCV gas phase temperatures (recent quarter)

*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.



* Indices related to the plant are values as of 11:00, November 27, 2024



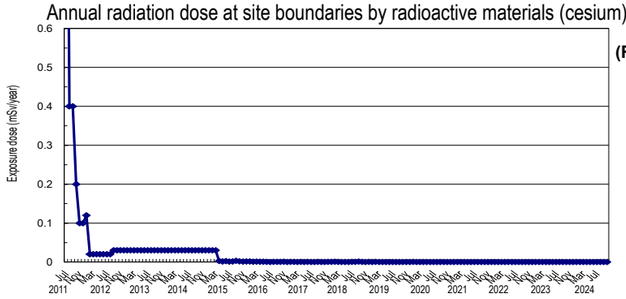
* Indices related to the plant are values as of 11:00, November 27, 2024

(*1) RPV (Reactor Pressure Vessel)
(*2) PCV (Primary Containment Vessel)
(*3) SFP (Spent Fuel Pool)

Release of radioactive materials from the Reactor Buildings

As of October 2024, 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. 7.1×10^{-12} Bq/cm³ and 1.1×10^{-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 0.00004 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 0.296–0.944 μSv/h (October 30 – November 27, 2024).
  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.

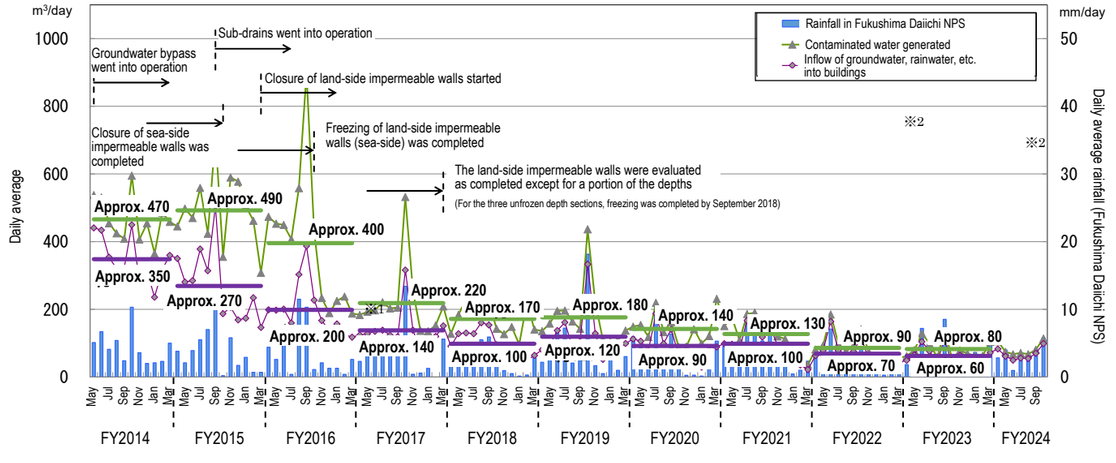
Based on the above, it was confirmed that the comprehensive cold shutdown state had been maintained and the reactors remained in a stabilized condition.

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 being 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 Subdrain & Groundwater drains

- At the Water-Treatment Facility Special for Subdrain & Groundwater drains, release started from September 14, 2015 and up until November 18, 2024, 2,594 release operations had been conducted.
  The water quality of all temporary storage tanks satisfied the operational target.

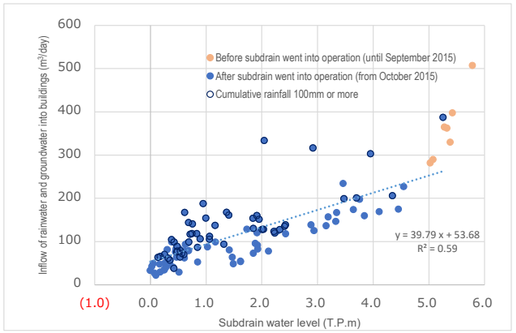


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 subdrains

➢ Implementation status of facing

- Facing is a measure that involves asphalting 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 October 2024, 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 October 2024, 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, a 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), a 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. On March 2, 2023, a 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 November 21, 2024, approx. 776,000 m³ had been treated.

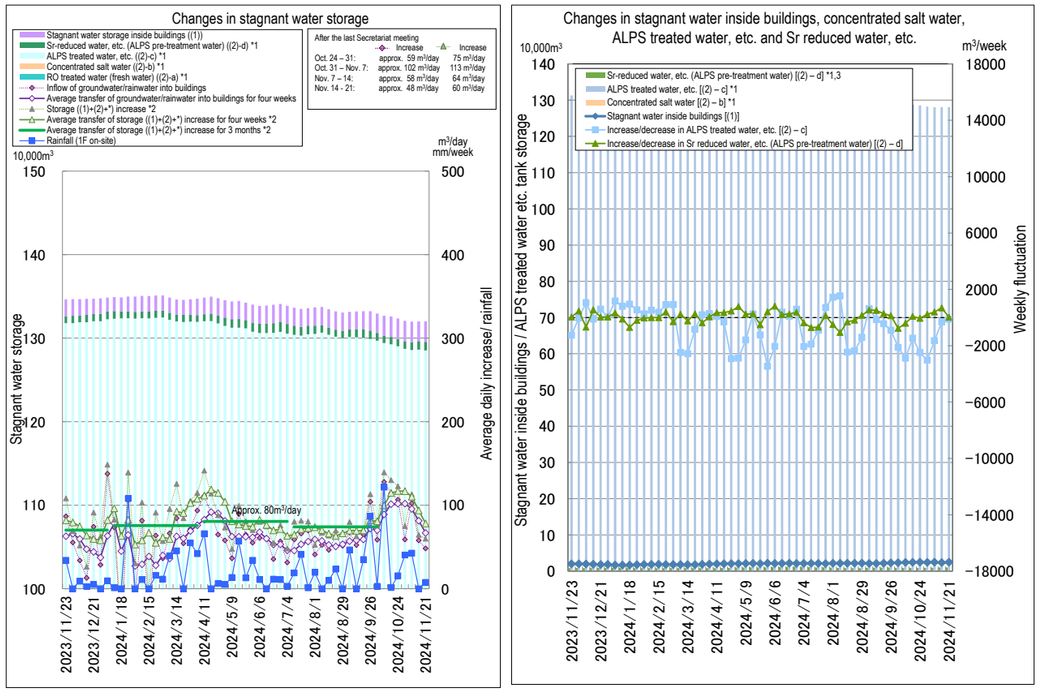
➢ Risk reduction of strontium-reduced water

- To reduce the risks of strontium-reduced water, treatment using existing, additional and high-performance multi-nuclide removal system is underway. Up until November 21, 2024, approx. 942,000 m³ had been treated.

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

- The amount of ALPS treated water, etc. was approx. 1,282,513 m³ as of November 21, 2024.
- The total amount of ALPS treated water discharged into the sea since the discharge commenced on August 24, 2023 was approx. 78,285 m³ as of November 27, 2024.

As of November 21, 2024



(1): Stagnant water storage inside buildings (Units 1-4, Process Main Building, High Temperature Incinerator Building, Waste Liquid Supply Tank, SPT (A), SPT (B), Units 1-3 CST, buffer tank)
(2): Units 1-4 tank storage [{(2)-a RO-treated water (fresh water)] + [(2)-b Concentrated salt water] + [(2)-c ALPS treated water, etc.] + [(2)-d Sr-reduced water, etc. (ALPS pre-treatment water)]
*: Water amount from tank bottom to water-level gauge 0% (DS)
*1: Water amount for which the water-level gauge indicates 0% or more
*2: Calculated in the method of contaminated water generated [(Inflow of groundwater/rainwater into buildings) + (other transfer) + (chemical injection into ALPS)], amount of ALPS treated water discharged was not taken into account.
*3: Amount of Sr-reduced water and others increased and decreased depending on the operation status of facilities due to clog of the cross-flow filter for the multi-nuclide removal system.

Figure 3: Status of stagnant water storage

➢ Status of discharge of ALPS treated water

As of November 26, 2024

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 November 25) ・Below the lower detection limit (less than 6.8 - 7.5 Bq/L)	○ ○
[TEPCO] Tritium concentration in seawater (sea-area monitoring at 1 point within 10 km square of the Power Station)	・Discharge suspension level: 30 Bq/L or less ・Investigation level: 20 Bq/L or less	(Sampled on November 25) ・Below the lower detection limit (less than 7.5 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 November 12 - 14) ・Below the lower detection limit (less than 8 - 9 Bq/L)	○ ○
[Fisheries Agency] Tritium concentration in marine products (flounder and others)	-	(Sampled on November 17) ・Below the lower detection limit (less than 8.0 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 November 14) ・Below the lower detection limit (less than 4.0 – 4.3 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 November 27, 2024, no significant variation had been detected.

- Regarding sea-area monitoring conducted by TEPCO at 4 points within 3 km of the power station, quick measurements taken of the tritium concentration in the seawater sampled on November 25 showed the tritium concentrations under the detection limit (less than 6.8 – 7.5 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 km square from the power station, quick measurements taken of the tritium concentration in the seawater sampled on November 25 showed concentrations under the detection limit (less than 7.5 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 from November 12 to 14 at 3 points off the coast of Fukushima Prefecture showed tritium concentrations below the lower detection limit (less than 8 - 9 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 November 17 showed tritium concentrations below the lower detection limit (less than 8.0 Bq/kg) in all samples.
  Fukushima Prefecture: On November 14, tritium concentrations in seawater at 9 sampling points off the coast of Fukushima Prefecture below the lower detection limit were recorded (less than 4.0 – 4.3 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 "ALPS reated water diluted with seawater"), no mass death or abnormality was detected (as of November 21).
- [Facility for rearing test of marine organisms (outside the 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 November 21).
- To confirm that the tritium concentration in marine organisms, which are reared in water discharged into the environment, is equivalent to the tritium concentration in water discharged into the environment (without being concentrated), six flounders reared in rearing water and water discharged into the environment were sampled and their tritium concentrations were measured.
- The analysis showed the Free Water Tritium (FWT) concentration in flounder was at the similar level with the tritium concentration in the rearing environment. Moreover, the growth situation of flounder and abalones remained unchanged before and after replacement with water discharged into the environment.
- 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.

➢ Status of inspection of K4 area tanks

- K4 area tanks, which have stored ALPS treated water, were manufactured in a factory from July to November 2016, before being installed on site and used sequentially from August 2016.
- A total of 35 tanks were installed, with painting and anti-corrosion specifications designed for a service life of 20 years.
- From March 2023, 30 tanks in Tank Groups A, B and C went into operation as the delusion and discharge facility of ALPS treated Water. Five tanks in Group E continue to store ALPS treated Water.
- The inside of the tanks in Group E (E1 – E5) was inspected from March to July 2024 and locally peeling paint and thinning at the peeling parts due to corrosion were detected in tanks E1, E2 and E5.
- Regarding the impact of the thinning, a simulation assessed the amount of stress on the tanks and confirmed that it would not affect their structural strength.
- Thinned parts were repaired by overlay welding and painting and subsequently restored.
- Periodical external and internal tank inspections will be conducted before the end of the service life, to detect abnormalities at an early stage and maintain long-term soundness by repairing as appropriate.

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

- At the Unit 1 Reactor Building, installation of the lower structure was completed on November 4. Installation of the upper structure commenced from November 15.
- To reduce the risk of coming into contact with the large cover upper structure and enhance seismic safety, perimeter steel frames are being removed from October 29.
- Removal work will be conducted remotely to limit worker exposure. Moreover, anti-scattering agents will be sprayed in each work area to suppress any scattering of dust and monitoring by dust monitors installed on the perimeter steel frames will continue.

➢ Main work to remove the spent fuel at Unit 2

- Before installing the fuel-removal system, work to create an opening on the south side of the Unit 2 Reactor Building operating floor is underway. Work to pull down the wall commenced from November 23.
- Moreover, work to install runway garter steel frames commenced from October 24, which involved carrying three of eight blocks into the south side gantry.
- At Units 4 and 3, from which fuel was removed previously, a decline in visibility was detected. To secure visibility during fuel-removal work, purification equipment will be installed in the pool in around the first half of 2025.

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 October 2024, the total storage volume for concrete and metal rubble was approx. 399,800 m³ (-400 m³ compared to the end of September with an area-occupation rate of 72%). The total storage volume of trimmed trees was approx. 73,900 m³ (-7,000 m³, with an area-occupation rate of 42%). The total storage volume of used protective clothing was approx. 10,800 m³ (-900 m³, with an area-occupation rate of 43%). 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 decrease in rubble was due to movement for area cleanup, etc.

➢ Management status of secondary waste from water treatment

- As of October 31, 2024, the total storage volume of waste sludge was 477 m³ (area-occupation rate: 68%), while that of concentrated waste fluid was 9,481 m³ (area-occupation rate: 92%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal system and others, was 5,814 (area-occupation rate: 87%).

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 Unit 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. 1-9 and 1-11. 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 or declining 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.

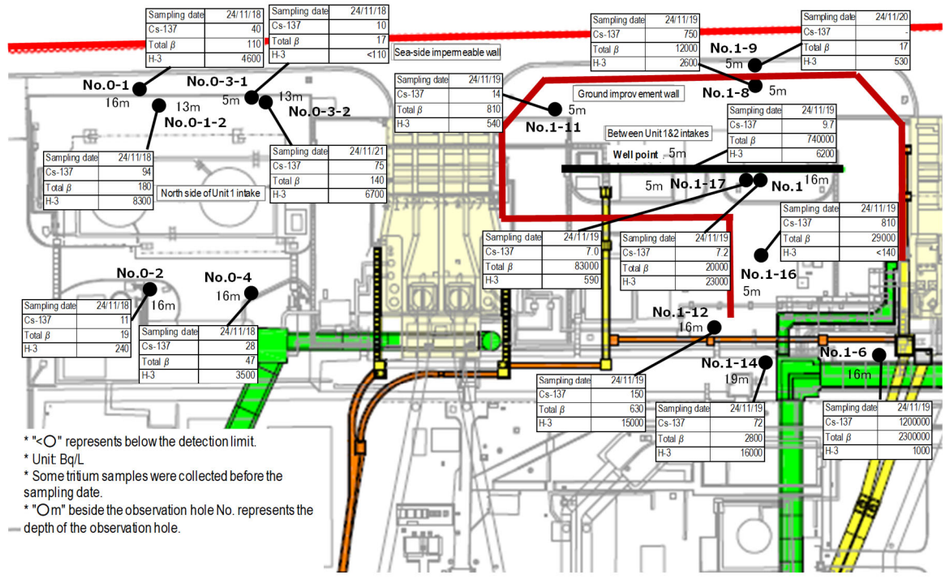


Figure 4: Groundwater concentration on the Turbine Building east side

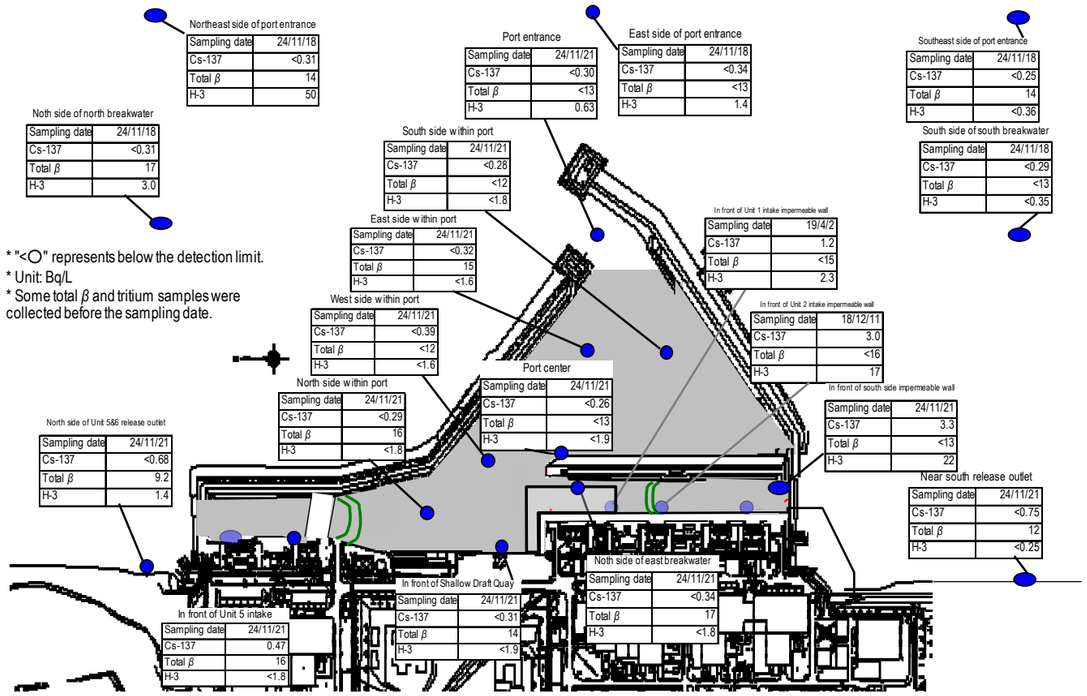


Figure 5: Seawater concentration around the port

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 July to September 2024 was approx. 9,100 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,600). 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 December 2024 (approx. 4,500 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 2 years were maintained, at approx. 3,500 to 4,700.
- The number of workers from within Fukushima Prefecture increased slightly and outside, increased. As of October 2024, 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.

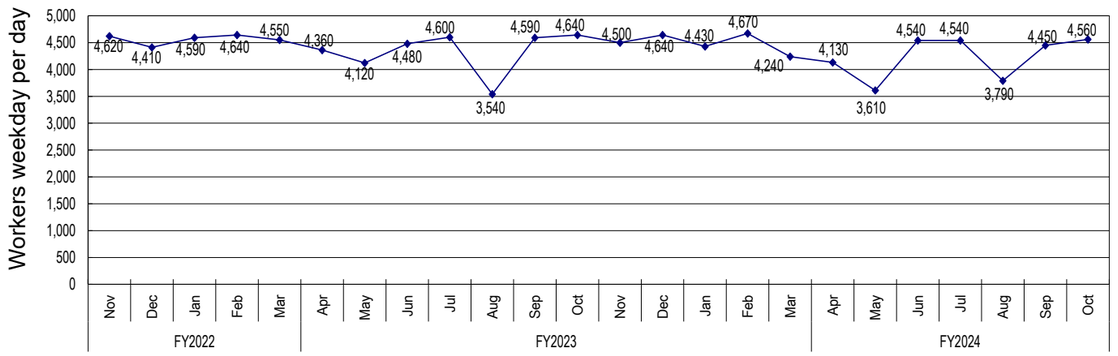


Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

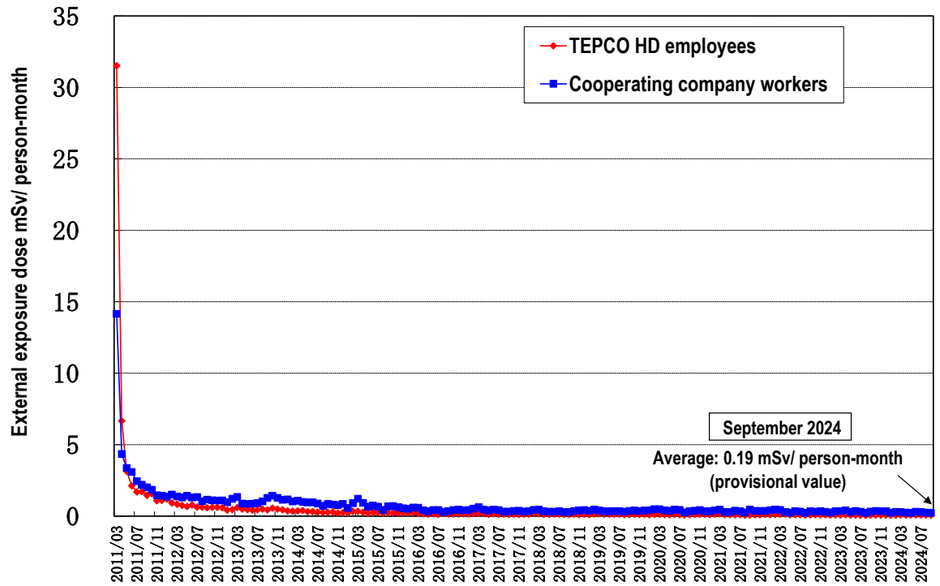


Figure 7: Changes in monthly average exposure dose of individual worker
(monthly exposure dose since March 2011)

➢ Status of countermeasures for heat stroke in FY2024

- In FY2024, measures to further prevent heat stroke commenced from April to October to cope with the hottest season.
- FY2024, eight workers suffered heat stroke due to work up until November 25 (in FY2023, seven workers up until the end of November), one worker increase compared to FY2023. Continued measures will be taken to prevent heat stroke.
- This fiscal year, in addition to the FY2023 measures, efforts were enhanced including “setting early first rest,” “reviewing methods such as how to take breaks during work wearing full-face masks” and “for decisions to suspend work, defining the conditions for each work task based on consultation between the department in charge of TEPCO and the company,” and water supply vehicles were improved.
- In F2025, as well as ongoing measures from this fiscal year, the necessary prevention measures will be reviewed based on the factors and characteristics of heat stroke occurrence in FY2024 to further improve the work environment.

➢ 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.

- As in previous years, to prevent the spread of influenza infections and serious infections, a vaccination program of influenza has been implemented since October for TEPCO HD employees and cooperating company workers in the Fukushima Daiichi Nuclear Power Station who wish to be vaccinated.

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 October 21 - November 25)"; unit (Bq/L); ND represents a value below the detection limit

Summary of TEPCO data as of November 26, 2024

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.

Cesium-134	:	ND(0.34)	
Cesium-137	:	ND(0.35)	
Total β	:	ND(12)	
Tritium	:	2.3	*1

Cesium-134	:	3.3 (H25/12/24)	→	ND(0.38)	Below 1/8
Cesium-137	:	7.3 (H25/10/11)	→	ND(0.28)	Below 1/20
Total β	:	69 (H25/8/19)	→	16	Below 1/4
Tritium	:	68 (H25/8/19)	→	0.63	Below 1/100

Cesium-134	:	3.3 (H25/10/17)	→	ND(0.34)	Below 1/9
Cesium-137	:	9 (H25/10/17)	→	ND(0.30)	Below 1/30
Total β	:	74 (H25/8/19)	→	13	Below 1/5
Tritium	:	67 (H25/8/19)	→	ND(1.7)	Below 1/30

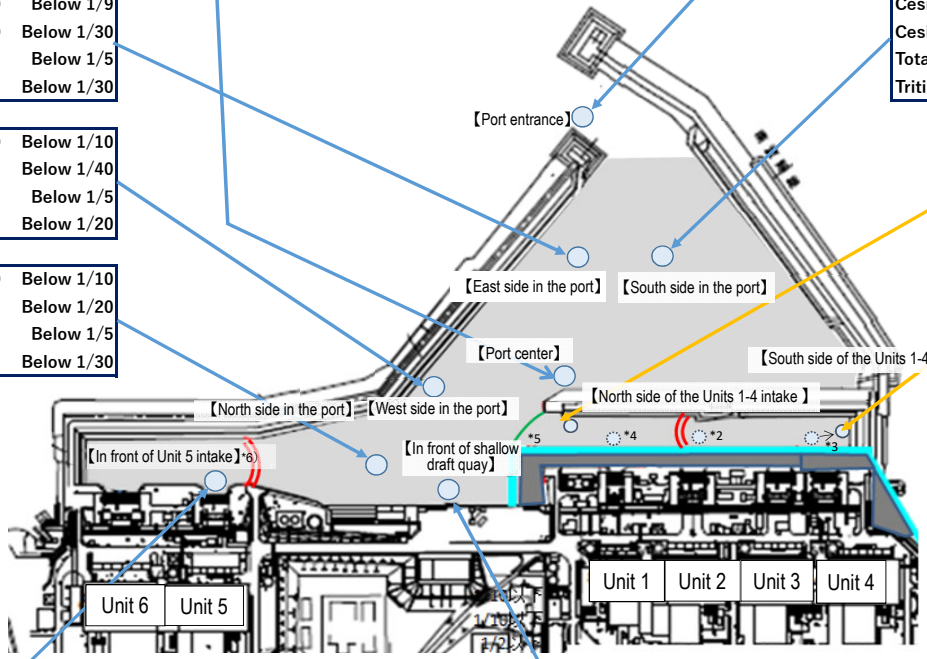
Cesium-134	:	3.5 (H25/10/17)	→	ND(0.29)	Below 1/10
Cesium-137	:	7.8 (H25/10/17)	→	ND(0.27)	Below 1/20
Total β	:	79 (H25/8/19)	→	ND(12)	Below 1/6
Tritium	:	60 (H25/8/19)	→	ND(1.5)	Below 1/40

Cesium-134	:	4.4 (H25/12/24)	→	ND(0.34)	Below 1/10
Cesium-137	:	10 (H25/12/24)	→	0.24	Below 1/40
Total β	:	60 (H25/7/4)	→	ND(12)	Below 1/5
Tritium	:	59 (H25/8/19)	→	2.8	Below 1/20

Cesium-134	:	32 (H25/10/11)	→	ND(0.34)	Below 1/90
Cesium-137	:	73 (H25/10/11)	→	0.62	Below 1/100
Total β	:	320 (H25/8/12)	→	ND(13)	Below 1/20
Tritium	:	510 (H25/9/2)	→	3.0	Below 1/100

Cesium-134	:	5 (H25/12/2)	→	ND(0.31)	Below 1/10
Cesium-137	:	8.4 (H25/12/2)	→	0.34	Below 1/20
Total β	:	69 (H25/8/19)	→	ND(12)	Below 1/5
Tritium	:	52 (H25/8/19)	→	ND(1.5)	Below 1/30

Cesium-134	:	ND(0.33)	
Cesium-137	:	2.5	
Total β	:	ND(13)	
Tritium	:	41	*1



Sea side impermeable wall
Silt fence
Silt fence for construction

Cesium-134	:	2.8 (H25/12/2)	→	ND(0.28)	Below 1/10
Cesium-137	:	5.8 (H25/12/2)	→	ND(0.30)	Below 1/10
Total β	:	46 (H25/8/19)	→	ND(12)	Below 1/3
Tritium	:	24 (H25/8/19)	→	ND(2.3)	Below 1/10

Cesium-134	:	5.3 (H25/8/5)	→	ND(0.29)	Below 1/10
Cesium-137	:	8.6 (H25/8/5)	→	ND(0.29)	Below 1/20
Total β	:	40 (H25/7/3)	→	ND(13)	Below 1/3
Tritium	:	340 (H25/6/26)	→	ND(1.9)	Below 1/100

*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

Source: TEPCO website Analysis results on nuclides of radioactive materials around Fukushima Daiichi Nuclear Power Station http://www.tepco.co.jp/decommision/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 October 21 - November 25)

Summary of TEPCO data as of November 26, 2024

	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

【Northeast side of port entrance (offshore 1 km)】

Cesium-134	: ND	(H25)	→	ND(0.27)	
Cesium-137	: ND	(H25)	→	ND(0.25)	
Total β	: ND	(H25)	→	14	
Tritium	: ND	(H25)	→	0.82	

【East side of port entrance (offshore 1 km)】

Cesium-134	: ND	(H25)	→	ND(0.26)	
Cesium-137	: 1.6	(H25/10/18)	→	ND(0.30)	Below 1/2
Total β	: ND	(H25)	→	ND(12)	
Tritium	: 6.4	(H25/10/18)	→	ND(0.34)	Below 1/10

【Southeast side of port entrance (offshore 1 km)】

Cesium-134	: ND	(H25)	→	ND(0.26)	
Cesium-137	: ND	(H25)	→	ND(0.27)	
Total β	: ND	(H25)	→	ND(12)	
Tritium	: ND	(H25)	→	ND(0.37)	

Cesium-134	: ND	(H25)	→	ND(0.33)	
Cesium-137	: ND	(H25)	→	ND(0.22)	
Total β	: ND	(H25)	→	ND(12)	
Tritium	: 4.7	(H25/8/18)	→	6.0	Below 1/10

【North side of north breakwater (offshore 0.5 km)】

Cesium-134	: 3.3	(H25/12/24)	→	ND(0.38)	Below 1/8
Cesium-137	: 7.3	(H25/10/11)	→	ND(0.28)	Below 1/20
Total β	: 69	(H25/8/19)	→	16	Below 1/4
Tritium	: 68	(H25/8/19)	→	0.63	Below 1/100

【Port entrance】

【South side of south breakwater (offshore 0.5 km)】

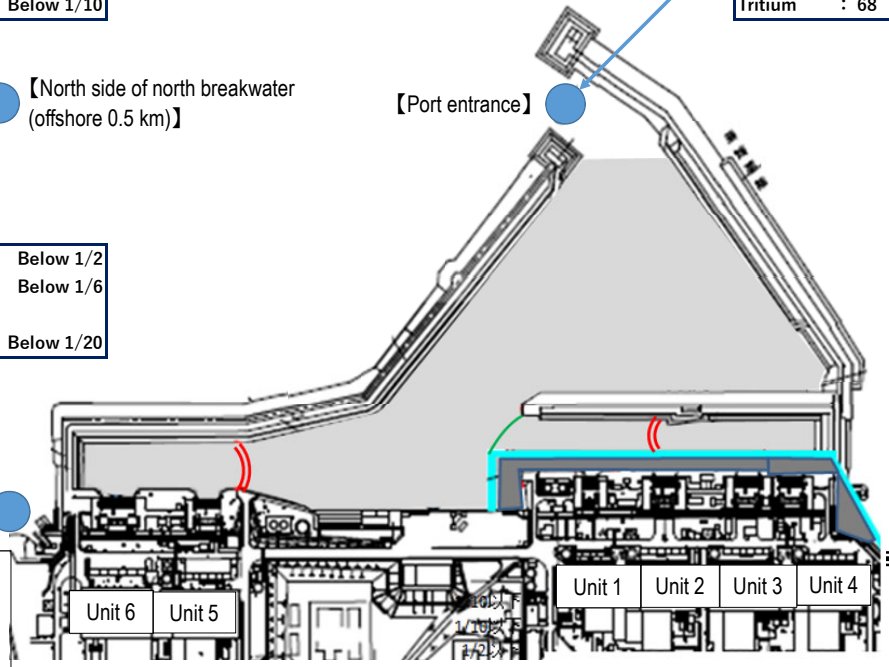
Cesium-134	: ND	(H25)	→	ND(0.30)	
Cesium-137	: ND	(H25)	→	ND(0.29)	
Total β	: ND	(H25)	→	ND(12)	
Tritium	: ND	(H25)	→	0.81	

Cesium-134	: 1.8	(H25/6/21)	→	ND(0.67)	Below 1/2
Cesium-137	: 4.5	(H25/3/17)	→	ND(0.67)	Below 1/6
Total β	: 12	(H25/12/23)	→	13	
Tritium	: 8.6	(H25/6/26)	→	ND(0.32)	Below 1/20

【North side of Unit 5 and 6 release outlet】

Cesium-134	: ND	(H25)	→	ND(0.86)	
Cesium-137	: 3	(H25/7/15)	→	ND(0.77)	Below 1/3
Total β	: 15	(H25/12/23)	→	11	
Tritium	: 1.9	(H25/11/25)	→	1.2	Below 1/2

【Near south release outlet (*)】



Sea side impermeable wall

Silt fence

Silt fence for construction

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/decommision/planaction/monitoring/index-j.html

TEPCO Holdings Fukushima Daiichi Nuclear Power Station Site Layout

Appendix 2
November 28, 2024

- Rubble storage area
- Used protective clothing
- Trimmed trees area
- Mid-/ low-level contaminated water
- Secondary waste from water treatment
- Waste treatment facility
- Non-controlled facility
- Analysis and research facility

MP-1 Temporary trimmed trees storage pool
MP-2
MP-3
MP-4
MP-5
MP-6
MP-7
MP-8 Temporary trimmed trees storage pool
Trimmed trees
Rubble
Used protective clothing
Additional Radioactive Waste Incinerator
1st Large Waste Storage
10th Waste Storage Facility (under construction)
Volume Reduction Facility
Radioactive Waste Incinerator
Futaba town
Unit 6
Unit 5
Downstream Pool
Upstream Pool
Vehicles maintenance site
3-9th Waste Storage Facilities
Town boundary
Water treatment facility for Subdrain
Periodical Inspection Material Storage (cutting of flanged-tanks)
1 and 2nd Waste Storage Facilities
JAEA Analytical Facility Management Building
K1 North
K2
K1 South
Temporary Cask Custody Area
K3
High-performance multi-nuclide removal system
Main Anti-Earthquake Building
K4
JAEA Analytical Facility Laboratory-1
Multi-nuclide removal system
Additional multi-nuclide removal system
Measurement/ Confirmation Tank
Large equipment
Land-side impermeable walls with frozen soil
Vehicle screening and decontamination site
Spent absorption vessel temporary storage
Mega float
Unit 1
Unit 2
Unit 3
Unit 4
Okuma town
H1
H2
H3
H4
H5
H6
D
E
F
Underground reservoirs
Partner Companies' Building
Groundwater bypass temporary storage tank
Common pool
2nd Cesium Adsorption Apparatus (HTI Building)
Sea side impermeable wall
Water desalinations (RO)
Temporary rest house outside the site
New Administration Office Building
Heliport
Large rest house
Cesium absorption apparatus (Incineration Workshop Building)
Cesium Adsorption Vessel Temporary Storage Facility
Decontamination instruments (Process main Building)
Temporary Waste Sludge Storage
3rd cesium adsorption apparatus (Onsite Bunker Building)
Onsite Bunker Building
Access Control Building
Water desalinations (evaporative concentration)
Water desalinations (RO)
J1 J2 J3 J4 J5 J6 J7 J8 J9
B C
G1 G1 South G3・G4・G5 G6 G7
Spent Adsorption Vessel Temporary Storage Facility
Tank installation status
Site boundary

1st Large Waste Storage Facility

Radioactive Waste Incinerator

10th Waste Storage Facility

Volume Reduction Facility

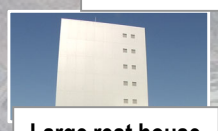
Solid Waste Storage Facility

Temporary waste sludge storage

Spent adsorption vessel temporary storage facility

Access Control Building

Large rest house



New Administration Office Building

Heliport

Tank installation status

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

1 Contaminated water management

- Efforts to promote contaminated water management based on three basic policies:
  ① "Remove" the source of water contamination ② "Redirect" fresh water from contaminated areas
  ③ "Retain" contaminated water from leakage

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)


Cesium Adsorption Apparatus (KURION)


Landing of the second Cesium Adsorption Apparatus (SARRY)


Multi-nuclide removal system (ALPS)


Pumping well


Subdrain purification system

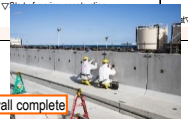

Land-side impermeable wall brine (refrigerant) circulation pipe


Unit 2 seawater pipe trench Shaft D filling work

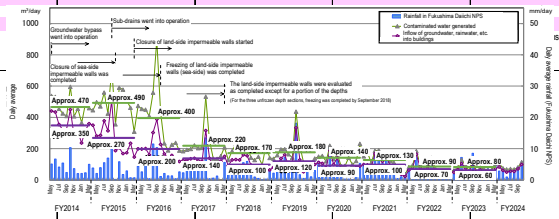

Placement of seaside impermeable walls complete


Construction of welded-joint tanks


Flanged and welded-joint tanks


Chishima Trench Tsunami Seawall complete

Japan Trench Tsunami Seawall



Contaminated water management【Remove】

Contaminated water treatment facility

2011
▽Reception start of contaminated water to Central Waste Treatment
▽Decontamination equipment (AREVA)
▽Evaporative concentration equipment
▽Cesium Adsorption Apparatus (KURION)
2012
tus (SARRY)
2014
3moval Equipment (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted
2015
▽Treatment of RO-condensed 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)
▽Treatment start of strontium-reduced water (ALPS: from 2015.12.4, additional: from 2015.5.27, high-performance: from 2015.4.15)
▽Multi-nuclide Removal Equipment (additional ALPS)
▽Multi-nuclide Removal Equipment (high performance ALPS) (from 2014.10.18, hot tests conducted)
2016
2017
▽Start of full-scale operation (from 2017.10.16)
2018
▽Purification of strontium-reduced water in flanged tanks complete
2019
▽Purification of strontium-reduced water complete
▽Reduction of strontium by 3rd Cesium Adsorption Apparatus (SARRY II) (from 2019.7.12)
2020
2021
2022
2023
2024
spection granted (2023.3.2)

Removal of contaminated water from seawater pipe trench

▽Trench Purification by mobile equipment
【Removal of contaminated water in seawater pipe trench】
Unit 2
▽Completion of tunnel filling
▽Transfer of stagnant water complete
▽Completion of shaft filling
Unit 3
▽Completion of tunnel filling
▽Filling of openings II and III complete
▽Transfer stagnant water complete
▽Completion of filling parts running over drainage channel
Unit 4
▽Completion of tunnel filling
▽Transfer of stagnant water complete
▽Completion of shaft filling (except for upper part of Shaft D)
▽Completion of shaft filling

Contaminated water management【Redirect】

Groundwater bypass

▽Installation start of groundwater bypass
▽Operation start of groundwater bypass (drainage started from 2014.5.21)
Suppressing the average amount of contaminated ▽ water generated to approx. 90 m³/day

Sub-drain

▽Recovery of existing sub-drain pit and start of new installation
▽Installation start of Water-Treatment Facility special for Sub-drain & Groundwater drains
▽Operation start of sub-drain (drainage started from 2015.9.14) (Treatment capacity: 1000 m³/day)
▽Enhancement of treatment capacity (2000m³/day)

Land-side impermeable wall

▽Start of maintenance operation on north and south sides
▽Freezing completion
▽Start of maintenance operation in all sections
In some temperature measurement tubes near the K drainage ▽ channel cross, temperature exceeded 0℃ locally
Start of maintenance operation on east side▽
▽Installation start of land-side impermeable walls
▽Freezing start
▽Freezing completion (except for some parts)
Although no influence was detected on the impermeable function of the land-side impermeable walls but test investigation is underway for the stoppage effect

Facing

▽Completion of waterproof pavement (facing) (except for areas of 2.5 and 6.5m above sea level and around Unit 1-4)
▽Completion of waterproof pavement (facing) (except for around Unit 1-4)

Contaminated water management【Retain】

Bank groundwater measures

High concentration of radioactive materials detected from observation well of bank ▽
▽Area 2.5m above sea level – Start of ground improvement by water glass
▽Completion
▽Start of pumping of water from contaminated areas (well point)
▽Installation start of seaside impermeable walls
▽Installation of seaside impermeable walls complete
▽Operation start of groundwater drain (pumping-up started on 2015.11.5)

Storage facility

▽Completion of purification treatment of RO concentrated salt water
▽Storage in steel square tanks
▽Completion of replacement of steel square tanks
▽Removal of steel horizontal tanks complete (except for condensed waste liquid storage tank)
▽Water leakage (300L) from flanged tank
▽Water leakage (100t) from flanged tank
▽Storage in flanged cylindrical tanks
▽Completion of fence to prevent leakage expanding
▽Water leakage (10L) from flanged tank
▽Work to raise fence height complete
▽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
▽Purification of strontium-reduced water complete
▽Sprinkling start of rainwater within tank fences by rainwater treatment facility (from 2014.5.21)

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 sub-drain water level
▽Transfer start from each building to Central Rw Building
▽Treatment of stagnant water in buildings complete
▽Reduction of stagnant water in the Reactor Buildings to approx. half of the level at the end of 2020 achieved
▽Floor exposure of Unit 1 T/B
▽Separation of stagnant water between Units 1 and 2
▽Floor exposure of Unit 1 Rw/B
▽Separation of stagnant water between Units 3 and 4
▽Floor exposure of Unit 2 T/B, Rw/B
▽Floor exposure of Unit 3 T/B, Rw/B
▽Floor exposure of Unit 4 R/B, T/B, Rw/B
▽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 Units 1 and 2 T/B complete
▽Work for common pool complete
▽Work for HTI building complete
▽Work for Process Main Building complete
▽Work for Unit 3 T/B complete
▽Work for Unit 1-3 R/B complete
▽Measures to close openings were completed
▽Work for Units 1-4 RwB was completed

Seawall

▽Installation of outer-rise tsunami seawall complete
▽Construction start of Chishima Trench Tsunami Seawall
Japan Trench tsunami seawall
▽Completion of installation ▽On-site start
Japan Trench Tsunami Seawall Completion of main wall construction▽

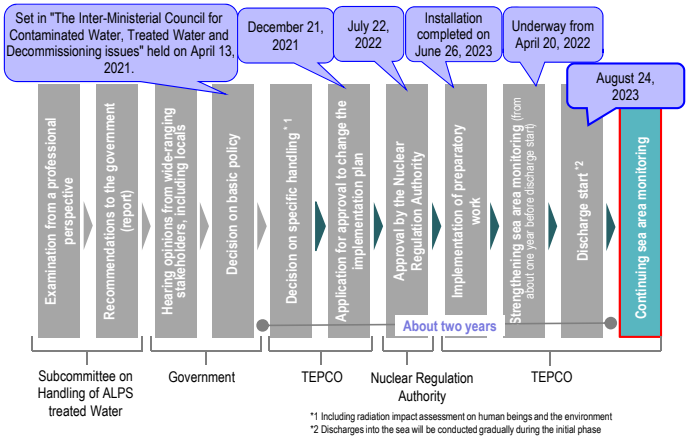
Mega float

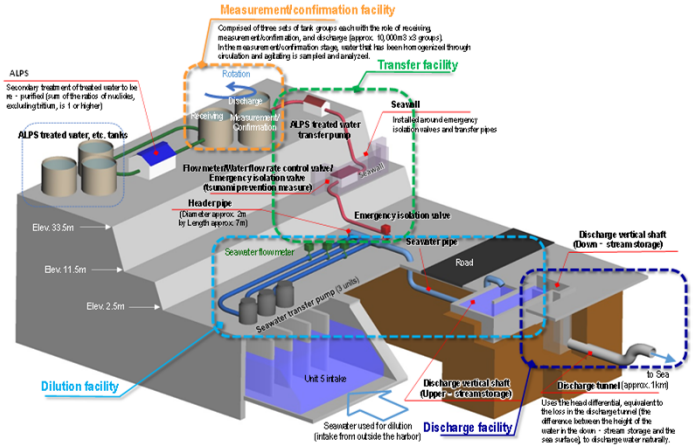
▽Internal filling complete (reduction of tsunami risks)

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.


Dialogue meeting

■ 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.

● 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.

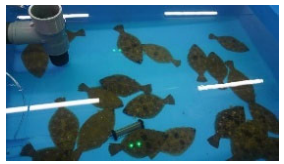
<Discharges in FY2024>

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 orgasms 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 rearing preparation tank


Overall view of mockup tanks

- Daily rearing status is published in the TEPCO website and Twitter
  - TEPCO website: http://www.tepco.co.jp/decommission/information/newsrelease/breedingtest/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

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

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

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

2021.12.21 The “Application Documents for Approval to Amend the Implementation Plan for Fukushima Daiichi Nuclear Power Station Specified Nuclear Facility” regarding ALPS treated water were submitted to the Nuclear Regulation Authority
2021.12.28 “The Action Plan concerning the Continuous Implementation of the Basic Policy on Handling of ALPS Treated Water” was formulated

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
2022.8/30 The "Approach to Strengthening and Expansion of Measures in the Handling of ALPS Treated Water" was summarized
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)
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)
2023.5.10 Approval
2023.6.26 Completion of installation
2023.7.7 Receipt of Certificate of Completion for Inspection Prior to Use
2023.8.24 Commencement of discharge

2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

3 Removal of fuel from spent pool

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

- Completion of Unit 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)

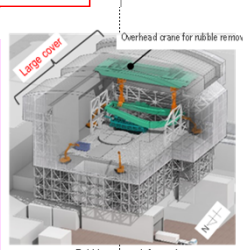
November 28, 2024
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

Legend: Rubble removal, etc. | Installing a fuel removal machine | Fuel removal | Storage and handling of fuel

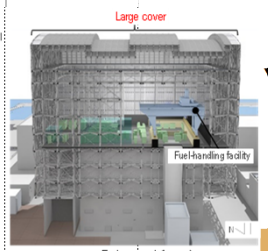
Unit 1

For Unit 1, a large cover will be installed over the whole building, within which rubble will be removed.

<Reference> Progress to date
Rubble removal on the north side of the operating floor started from January 2018 and has been implemented sequentially. In July and August 2019, the well plug, which was misaligned, was investigated, followed in August and September by the conditions of the overhead crane. Based on the results of these investigations, as the removal requires more careful work taking dust scattering into consideration, two methods were examined: Installing a cover after rubble removal, initially installing a large cover over the Reactor Building, then removing rubble inside the cover.



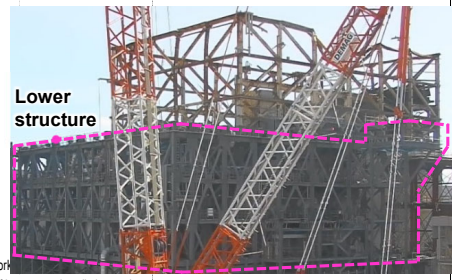
Rubble removal (image)



Fuel removal (image)

In order to install a large cover at Unit 1 reactor building, a high-dose locations were identified on the south exterior wall, and as a measure to reduce exposure, shielding was installed over the high-dose locations.
The need to implement safety measures for high-dose locations on the walls of the reactor buildings, the construction of the Unit 1 large cover should be completed around the summer of FY2025.
Among the milestones of the Mid-and-Long-term RM, the start of Unit 1 fuel removal, which is set from FY2027 to FY2028, is not expected to be affected by the close examination of the process after the installation of the large cover.

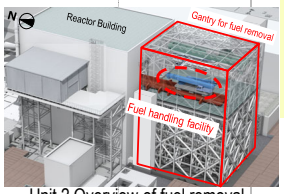
▼2017.12 Completion of building cover dismantling and windbreak fence installation
▼2018.1-2020.12 Rubble removal on the north side of Reactor Building
▼2018.9-12 Removal of X-braces
▼2020.3-6 Installation of spent fuel pool cover
▼2020.9-11 Measures to prevent and alleviate rubble falling
▼2020.11-2021.6 Dismantling of remaining cover
▼2021.8 Start of large cover pre-work
▼2022.4 Start of large cover installation work



<Unit 1 northwest side 2024.1.24>

Unit 2

For Unit 2, with the removal of spent fuel in mind, a “gantry for fuel removal” (gantry and front room) will be constructed on the south side of the building.



Unit 2 Overview of fuel removal (bird's-eye view)

<Reference> Progress to date
Previously, scope to recover the existing overhead crane and the fuel-handling machine was examined. However, the high radiation dose inside the operating floor meant the decision was taken to dismantle the upper part of the building in November 2015. Findings from internal investigations of the operating floor from November 2018 to February 2019 underlined the potential to conduct limited work there and the means of accessing from the south side was examined.


<Unit 2 Construction of gantry for fuel removal>

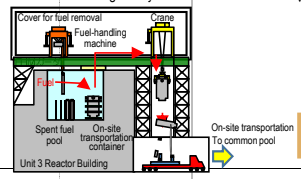
As part of efforts to remove fuel from the Unit 2 spent fuel pool and based on findings from internal operating floor investigations from November 2018 to February 2019, instead of fully dismantling the upper part of the building, the decision was made to install a small opening on the south side and use a boom crane. Examination continues to initiate fuel removal from FY2024 to FY2026.

▼2018.8-2020.12 Moving and containment of remaining objects
▼2020.6 Investigation inside the spent fuel pool
▼2021.6-2022.1 Decontamination of R/B operating floor (1)
▼2021.9-2022.5 Shielding installation in R/B operating floor (1)
▼2022.5-2022.6 Transfer of FHM
▼2022.7-2023.1 Removal and clean-up of FHM operation room
▼2022.12-2023.3 Removal of existing facilities in operating floor
▼2023.4-2023.11 Decontamination of R/B operating floor (2)
▼2023.11- Shielding of R/B operating floor (2)
▼2024.6- Completion of installation of gantry for fuel removal
▼2016.9-2017.4 West-side gantry installation work
▼2017.5 Opening a hole in the west-side external wall
▼2021.10-2022.4 Ground improvement work
▼2023.1 Start of steel erection
▼2023.2 Start of south-side existing facilities dismantling

Unit 3

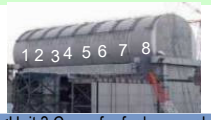
All fuel assemblies from Unit 3 had been removed by February 2021.

Overview of the fuel-handling facility inside the cover



Before installing a cover for fuel removal, the process of removing large rubble from the spent fuel pool was completed in November 2015. To ensure safe and steady fuel removal, training via remote control was conducted at the factory using the actual fuel-handling machine to be installed on site (February – December 2015). Installation of the fuel removal cover was completed on February 23, 2018.
With fuel removal in mind, rubble retrieval training inside the pool, which was scheduled in conjunction with fuel removal training, started from March 15, 2019 and fuel removal started from April 15, 2019. Fuel removal was completed on February 28, 2021.

▼2013.10 Completion of removal of large rubble on the Reactor Building top floor
▼2015.8 Completion of removal of the fuel-handling machine B within the spent fuel pool
▼2016.12 Completion of shielding on the Reactor Building top floor
▼2017.1 Installation start of a cover for fuel removal
▼2019.4.15 Start of fuel removal
▼2021.2.28 Fuel removal completed (566 assemblies)



<Unit 3 Cover for fuel removal (dome roof) 2019.2.21>

Unit 4

All fuel assemblies from Unit 4 had been removed by December 2014.

▼2011.11- 2012.7 Removal of rubble on the Reactor Building top floor
▼2012.4-2013.3 Ground improvement and foundation work
▼2013.4-2013.7 Installation of external walls and roof panels
▼2013.6-2013.10 Installation of overhead crane and fuel-handling machine
▼2013.8-2013.10 Removal of rubble inside the reactor well and pool
▼2013.11.18 Start of fuel removal
▼2014.12.22 Fuel removal was completed (1533 assemblies)


<Unit 4 Cover for fuel removal>

In the Mid- and-Long-Term Roadmap, the Phase 1 target involved starting to remove fuel from inside the spent fuel pool (SFP) of the 1st Unit within two years of completing Step 2 (by December 2013).
On November 18, 2013, fuel removal from Unit 4, namely the first Unit, got underway and Phase 2 of the roadmap started.
On November 5, 2014, within a year of commencing fuel removal work, all 1,331 spent fuel assemblies in the pool had been transferred. The transfer of the remaining non-irradiated fuel assemblies to the Unit 6 SFP was completed on December 22, 2014. (two of the non-irradiated fuel assemblies were removed in advance in July 2012 for fuel checks)
This marks the completion of fuel removal from the Unit 4 Reactor Building.


Fuel removal

* Part of the photo is corrected because it includes machine information related to nuclear material protection.

4 Work toward fuel debris retrieval

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

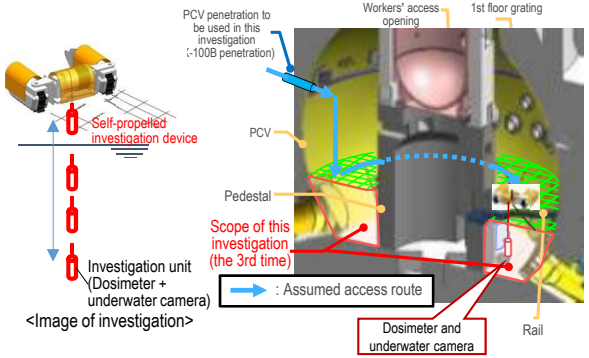
Commencement of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (From September 10, 2024, trial fuel debris retrieval commenced)

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

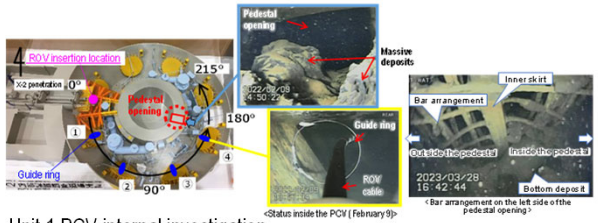
・In April 2015, a device having entered the inside of the PCV via a narrow opening (bore:φ100 mm) collected information such as images and airborne dose inside the PCV 1st floor.

・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.



<Image of investigation>

・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.



<Status inside the PCV (February 9)> <Bar arrangement on the left side of the pedestal opening>

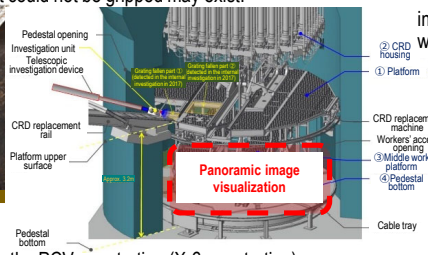
Unit 2 Investigation overview

・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.


Bottom of the pedestal (after being processed in panoramic image visualization)



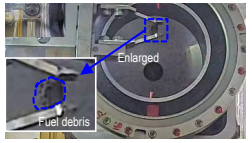
・In October 2020, deposits contact investigation the PCV penetration (X-6 penetration) was conducted. This confirmed that deposits inside the penetration had not deformed and come unstuck.

<Conditions of deposits before and after contact>


<Work in front of the penetration>

・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.

Gripping fuel debris with the end tool



Collecting gripped fuel debris in the transportation box

Unit 3 Investigation overview

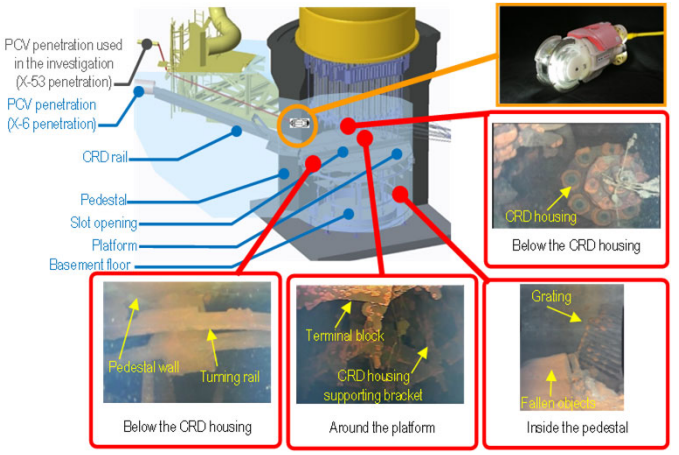
・In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, was investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.

・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 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	- 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)	Confirming the status of the PCV 1st floor - Acquiring images - Measuring the air temperature and dose rate - Replacing permanent monitoring instrumentation
	3rd (2017.3)	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)	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	- PCV vent pipe vacuum break line bellows (identified in 2014.5) - Sand cushion drain line (identified in 2013.11)	
Evaluation of the location of fuel debris inside the reactor by measurement using muons Confirmed that there was no large fuel in the reactor core. (2015.2-5)		

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	
Evaluation of the location of fuel debris inside the reactor by measurement using muons 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 PCV internal investigation

Investigations inside the PCV	1st (2015.10-12)	- 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)	- 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)		

Images are provided by the International Research Institute for Nuclear Decommissioning (IRID)

5 Management of solid radioactive waste

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)

★2017.6 Revision ★2018.6 Revision ★2019.6 Revision ★2020.7 Revision ★2021.7 Revision ★2023.2 Revision ★2023.11 Revision

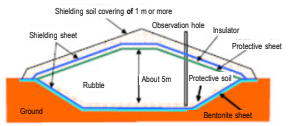
★ 2016.3 Announcement of Storage Management Plan of Solid Waste (Ver. 1)

▼ 2012.9 Transfer start of rubble to the soil-covered temporary storage facility

▼ 2015.6 Transfer start of rubble to the soil-covered temporary storage facility (Tank 3)

▼ 2013.1 Start of volume reduction of trimmed trees and storage in temporary storage tank A

▼ 2019.6 Start of building construction
1st Large Waste Storage
1st Large Waste Storage Roof construction (from the inside)



<Outline of soil-covered temporary storage facility>


External view of the 9th Solid Waste Storage

▼ 2014.7 Start of pre-work
9th Solid Waste Storage


Whole view of the soil-covered temporary storage facility Tank 3

▼ 2018.2 Operation start

2021.3 High alert issued from the Shallow Draft Quay drainage channel PS monitor▼ (leakage from temporary storage Area W)

▼ 2021.7 Leakage of radioactive materials from a notch tank stored in temporary storage Area P

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

▼ 2013.5 Installation work gets underway
Solid Waste Incinerator

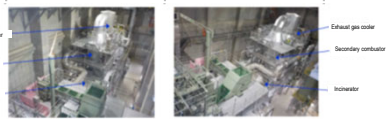
▼ 2016.3 Operation start

▲2016.8-11 Manual stop (due to pin-hole incidence)


Whole view of Solid Waste Incinerator


Electrical room


Control room



Whole view of Solid Waste Incinerator (Left: System A; right: System B)

2017.10 Installation work gets underway

▼ 2017.4 Start of pre-work
Additional Solid Waste Incinerator

▼2022.5 Start of operation

Large Equipment Decontamination Facility

▼ 2018.5 Operation start
Large Equipment Decontamination Facility

▼ 2020.9 Start of pre-work
Compaction Facility

2024.2 Start of operation ▼

Site of Volume Reduction Facility

Present status Note

Storage of rubble and others

Present storage Approx.520,000 m³ (as of 2023.3)

Rubble (combustible), trimmed trees, used protective clothing)

Contaminated soil (0.005 - 1 mSv/h)

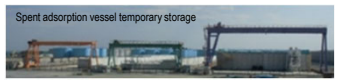
Rubble (metal, concrete, others)

More than 1 mSv/h

0.005-1 mSv/h

Less than 0.005mSv

Storage of water treatment secondary waste



Estimate for the next decade (or so) Approx.**760,000** m³ (*2)

Approx. 300,000 m³
Approx. 70,000 m³
Approx. 60,000 m³
Approx. 140,000 m³
Approx. 180,000 m³
Approx. 7,400 tanks

Status after a decade

(*3) Legend : Newly installed equipment and facility

Incineration

Incinerator Pre-treatment Facility (scheduled for completion in FY2025)

To (A) (*1)

Radioactive Waste Incinerator

Additional Radioactive Waste Incinerator (Completion in May 2022)

Approx. **290,000** m³ (*2)

Stored and managed in Solid Waste Storage as done for rubble

Volume reduction

To (A) (*1)

Compaction Facility (scheduled for completion in FY2022)

Melting

Melting equipment (under consideration)

To (B)

Treatment measures and others will be examined

Storage /management

Approx. 20,000 m³ (*2)
Approx. 70,000 m³
(A) Approx. 80,000 m³ (*1)
(B) Approx. 60,000 m³
Approx. 50,000 m³ (*1)

Solid Waste Storage (Storage capacity: approx. 250,000 m³)

Existing Solid Waste Storage 1st-8th (existing) 9th (Operation launch in 2018.2)

Additional Solid Waste Storage 10th-11th (Scheduled for completion after FY2024)

Based on the estimates for the amount of waste to be generated, the storage capacity (approx. 250,000 m³) will be reached in around 2031. Scope to install an additional solid waste facility and others will be examined

Reuse will be examined

Spent Adsorption Vessel Temporary Storage

Large Waste Storage (Scheduled for completion FY2025)
The earthquake-resistant design is being reviewed based on the Fukushima prefecture offshore earthquake in FY2021

(*1) Items for which incineration, compaction, melting or reuse is difficult are stored directly in Solid Waste Storage without being treated
(*2) As values less than 10,000 m³ are rounded, they may not be consistent with the total of breakdown
(*3) In the estimate, approx. 240,000 m³ of waste will be stored in Solid Waste Storage at the end of FY2028.

Note: Used protective clothing before incineration and BG-level concrete waste for which treatment and reuse is decided at present are not included.

- 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.

6 Improvement of work environment

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.

2011 2012年 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023～

▼ From March 12, 2011, in response to the increased airborne concentration of radioactive materials, instructions were issued to wear full-face masks throughout the Fukushima Daiichi NPS site, excluding the Main Anti-Earthquake Building and the rest house.


External view of Access Control Facility

▼ From May 2013, full-face mask unnecessary area was expanded sequentially.

▼ In June 2013, operation of the Access Control Facility started near the main gate of the Fukushima Daiichi NPS, to which duties conducted at J-village were shifted, including contamination examination, decontamination, switching protective equipment on and off and distribution/collection of dosimeters.


Large rest house under construction (2014.9.30)


Access Control Facility (2014.11.7)

▼ To help workers in the Fukushima Daiichi NPS precisely understand the conditions of their workplaces, a total of 86 dose-rate monitors were installed by January 2015. These monitors allow workers to confirm on-site dose rates at their workplaces in real time.

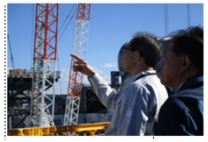
▼ In March 2015, the Fukushima revitalization meal service center opened.

▼ A large rest house for workers was established and its operation commenced in May 2015. Spaces in the large rest house are also installed for office work and collective worker safety checks as well as taking rest. In March 2016, a convenience store opened in the large rest house. In April, the shower room went into operation.

▼ In February 2017, operation started at the Partner Companies' Building next to the New Administration Office Building.

▼ In May 2017, a heliport for emergency transport was installed inside the Fukushima Daiichi NPS and went into operation. Compared to the previous operation (at Koriyama Coast, Futaba Town or Fukushima Daini NPS, relaying to a doctor helicopter), a faster response is available for seriously ill patients requiring treatment at external medical institutions.

▼ From November 2018, from the west-side high-ground area, where Unit 1-4 can be viewed, visitors can see the site in their normal clothes without having to change.

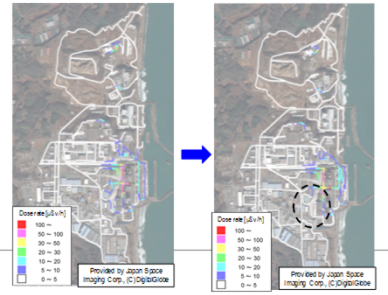

Visit by Governor of Fukushima Prefecture to the Fukushima Daiichi NPS (2018.11.1)


Visit by Prime Minister Kishida to the Fukushima Daiichi NPS (2021.10.17)


Visit by Prime Minister Kishida to the Fukushima Daiichi NPS (2023.8.21)
Observation of ALPS Treated Water Dilution/Discharge Facilities from high ground on Units 5 and 6 side

<Travel survey results of major roads within the site>
It was confirmed that compared with the last fiscal year, the dose rate has been declining on roads on the west and south sides of the High Temperature Incinerator Building (area circled by black dot line).

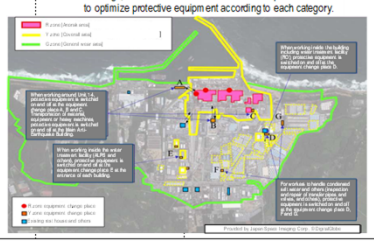
<FY2022 4th Quarter> (Measured in February2023)
<FY2023 4th Quarter> (Measured in February2024)



▼ In May 2013, areas excluding those around Unit 1-4, tank areas and rubble storage areas were set to full-face mask unnecessary areas.

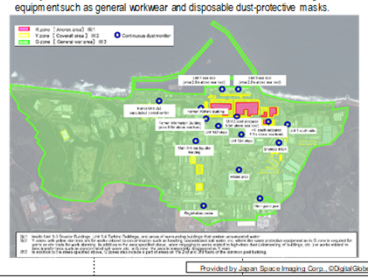
▼ In May 2015, full-face mask unnecessary area was expanded to cover about 90% of the site.

▼ In March 2016, based on the progress of measures to reduce the environmental dosage on site, the site was categorized into two zones: Highly contaminated area around Unit 1-4 buildings, etc. and other areas where limited operation started to optimize protective equipment according to each category.



▼ In March 2017, the G-zone area was expanded (to cover 95% of the whole site).

▼ In May 2018, within about 96% of the site, workers are allowed to wear light equipment such as general workwear and disposable dust-protective masks.



▼ In August 2021, operation started while eliminating the need for the DS2 mask during light work in G-zone outside the protection area around Unit 1-4 (except for inside Units 5 and 6).


Move in general working clothes (2016.1.7)


Facing (2017.4.13)