Outline of Decommissioning, Contaminated Water and Treated Water Management

January 30, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

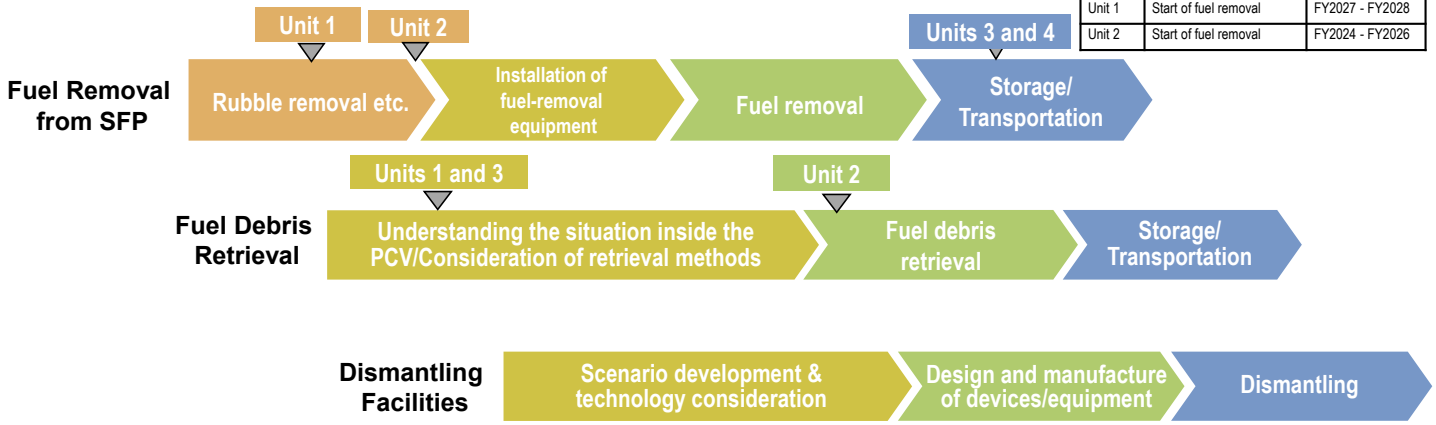
Main decommissioning work and steps

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 >

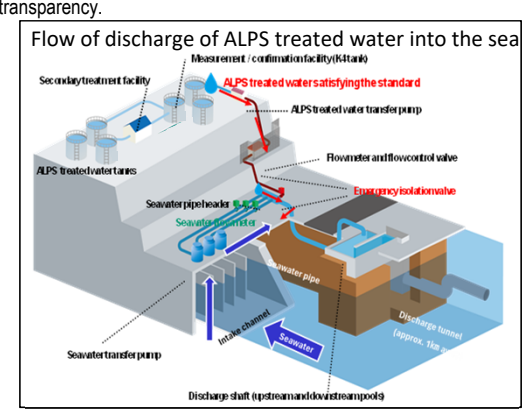
Units 1-6	Completion of fuel removal	Within 2031
Unit 1	Start of fuel removal	FY2027 - FY2028
Unit 2	Start of fuel removal	FY2024 - FY2026



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.



Contaminated water management - triple-pronged efforts -

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

① "Removing" the contamination source ② " Redirecting" groundwater from the contamination source ③ "Preventing leakage" of contaminated water

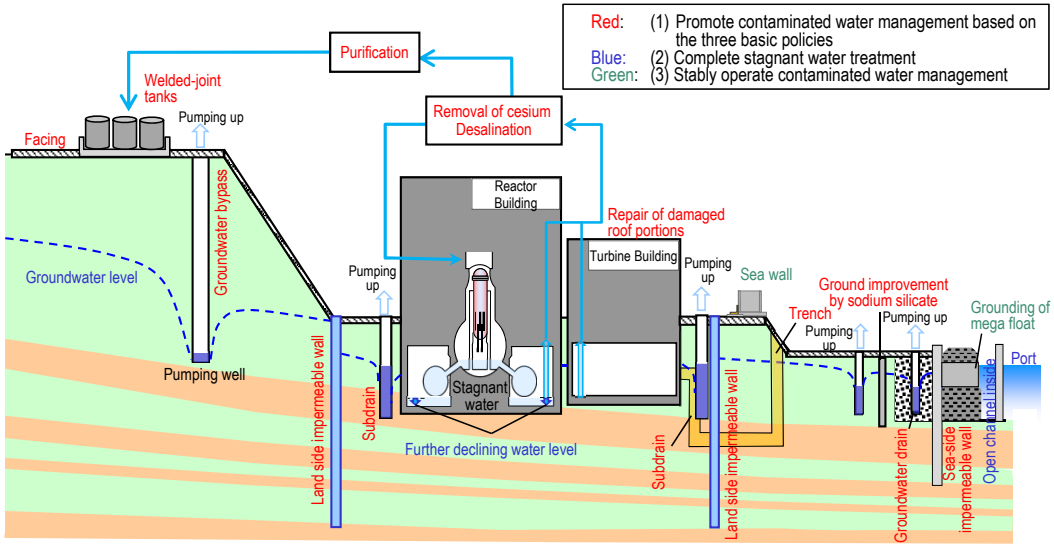
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal system) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and subdrains, have stabilized the groundwater at a low level and the increased contaminated water generated during rainfall is being suppressed by repairing damaged portions of the building roofs facing onsite. Through these measures, the generation of contaminated water has been suppressed and reduced, from approx. 540 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 Units 1-3 Reactor Buildings, Process Main Building and High-Temperature Incinerator Building.
- While assessing the dust impact, measures to reduce the stagnant water level were implemented. In March 2023, the target water level in each building was achieved. For the Units 1-3 Reactor Buildings, "reducing stagnant water in the Reactor Buildings to about half the amount at the end of 2020 during the period FY2022-2024" was achieved.
- For zeolite sandbags on the basement floors of the Process Main Building and High-Temperature Incinerator Building, measures to reduce the radiation dose are being examined with stabilization in mind.

(3) Efforts to stably operate contaminated water management

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



Progress Status 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.

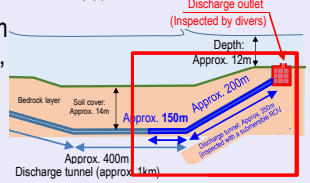
FY2025 ALPS treated water discharge plan (draft)

The draft FY2025 ALPS treated water discharge plan (annual discharges: 7 times; annual amount of water to be discharged: approx. 54,600m^3; annual amount of tritium to be discharged: approx. 15 trillion Bq) will be compiled by the end of this fiscal year after reflecting opinions from various stakeholders, including Fukushima Prefecture.

Moreover, ALPS treated water dilution and discharge facility and discharge/intake facility are being inspected. To date, no abnormalities affecting the discharge process have been detected. Inside the tunnel up to approx. 350m from the discharge tunnel exit and at the discharge outlet, no abnormalities were detected by the submersible ROV and divers.

Currently, toward the 7th discharge of FY2024, the measurement/confirmation facility C is being analyzed.

Discharge tunnel wall surface conditions (approx. 100m from the exit)

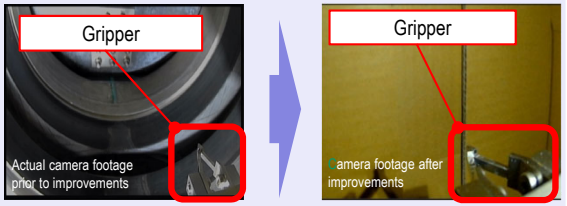


Scope of inspection

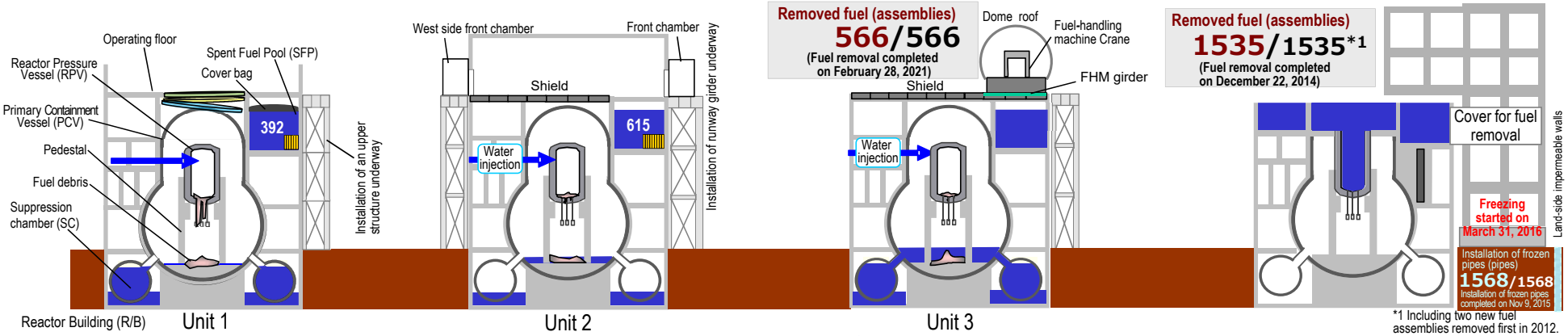
Unit 2 Progress of trial fuel debris retrieval

Toward additional fuel debris sampling by the telescopic device, replacement of the camera mounted at the end of the device and improvement to stabilize the end jig hanging down are being examined. By improving the installation position of the gripper, monitoring camera and light, the gripper visibility was compared and confirmed as having no problem. Going forward, the improved end jig will be manufactured and subjected to factory verification tests.

Regarding the robotic arm, at the mockup facility simulating the on-site environment, combined once-through tests (robotic arm + double arm manipulator) are underway. Moreover, access route construction tests by removing the deposit left over in X-6 penetration commenced. Improvements to the control program to reduce the risk of contact of the arm and other tests will simultaneously continue.



< Improvements to the telescopic device end jig >



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

15th survey to improve the work environment

From September to October 2024, the 15th survey to improve the work environment was conducted, to which approx. 5,500 workers responded.

In this survey, new questions were added about awareness during on-site work, asking whether “an environment allowing workers to say what they are aware of at any time” still existed and more than 80% responded in the affirmative. TEPCO will continue to prioritize an environment in which people “stop if something happens” and “can discuss what they are aware of.”

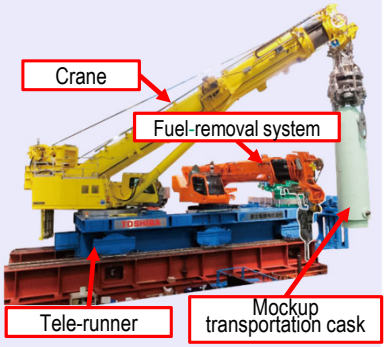
Regarding the concern about radiation,” responses expressing concern increased compared with in the previous survey. Several factors can be considered for this result, but in related questions, responses expressing concern about “body contamination” increased. Accordingly, troubles related to body contamination in 2023 may be a factor.

To ensure worker safety, thoroughly preventing such issues is crucial. TEPCO HD will further improve the safety level together with each cooperating company, while continuing efforts, including a review of educational texts related to radiation protection to further deepen understanding about the work environment in the Fukushima Daiichi Nuclear Power Station.

Unit 2 Progress of work before fuel removal

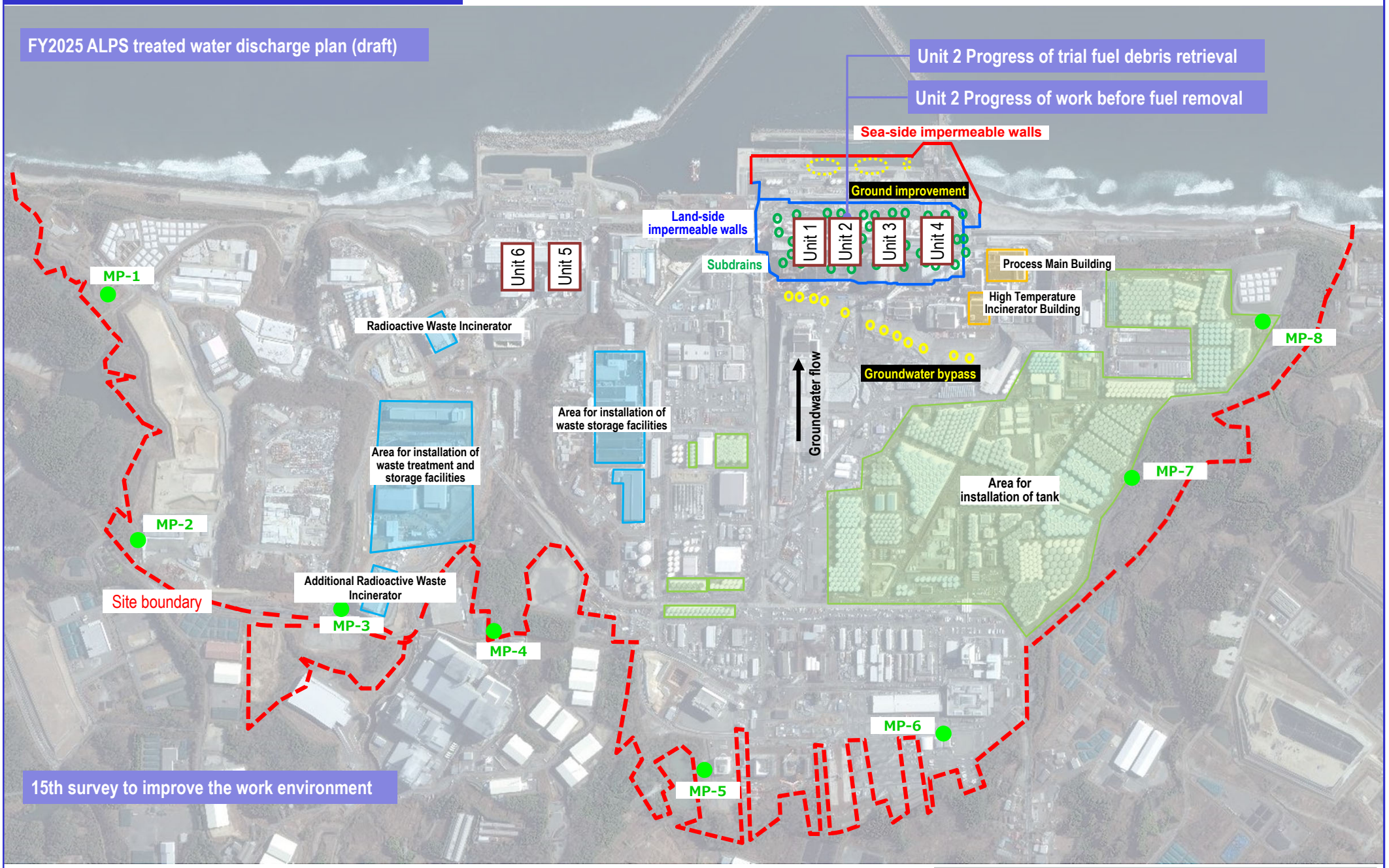
In Unit 2, work to install a runway girder, part of the foundation of rails to be used when the fuel removal system moves between the Reactor Building and the front room, is underway. The runway girder consists of eight steel blocks. After being assembled off site, the blocks are carried in on-site and installed in the front room of the Reactor Building. Installation commenced from October 2024 and six of eight blocks were carried into the front room.

At the off-site factory, trial operations related to each equipment component of the fuel removal system continue. As a specific example, using a mockup transportation cask, the operational state of the crane is verified. After the trial operation and covering the system, it will be transported by sea.



< Trial operation of the fuel-removal system >
(Crane operation is being verified >

Major initiatives – Locations on site

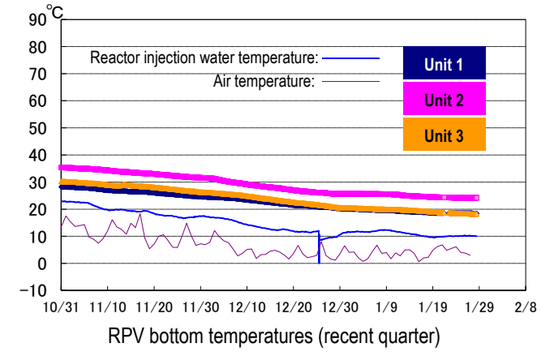


Provided by Japan Space Imaging Corp., photo taken on January 14, 2024
Product (C) [2024] Maxar Technologies.

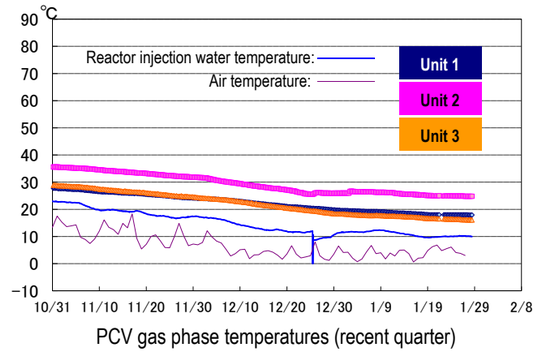
I. Confirmation of the reactor conditions

Temperatures inside the reactors

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

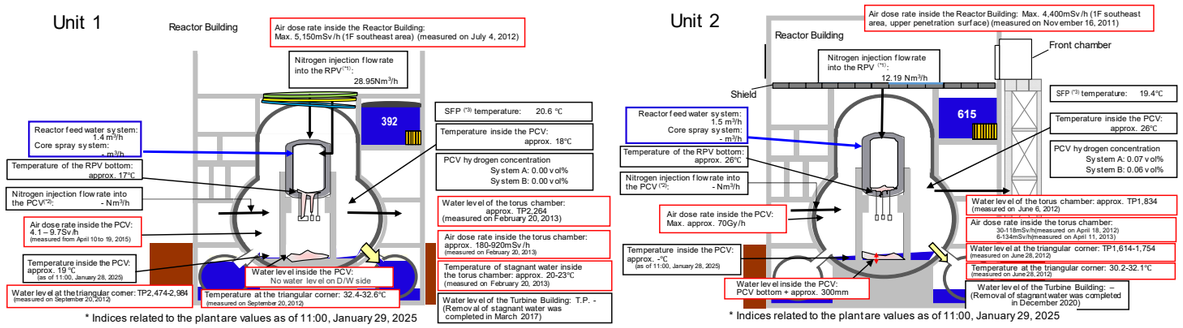


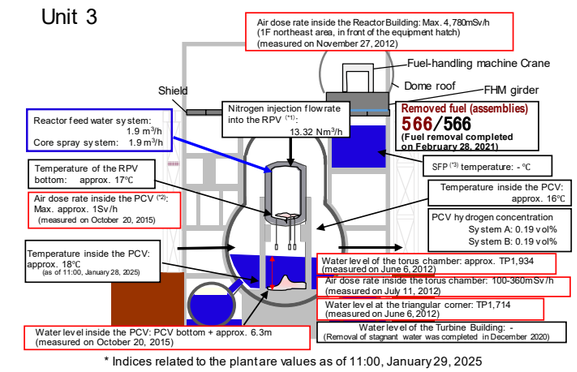
RPV bottom temperatures (recent quarter)



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.



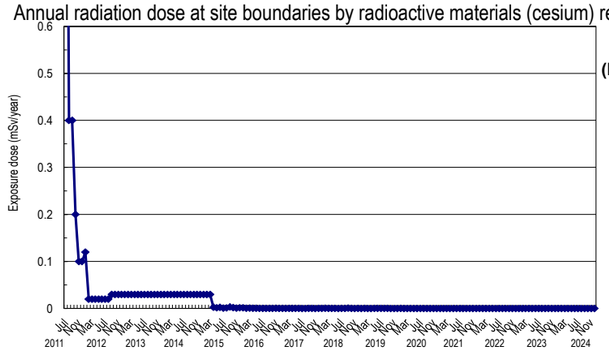


(*1) RPV (Reactor Pressure Vessel)
(*2) PCV (Primary Containment Vessel)
(*3) SFP (Spent Fuel Pool)

Release of radioactive materials from the Reactor Buildings

As of December 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. 7.5×10^{-12} Bq/cm³ and 1.3×10^{-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 0.297–0.981 μSv/h (December 25, 2024 – January 28, 2025).
To measure the variation in the air dose rate of MP2-MP8 more accurately, work to improve the environment (trimming trees, removing surface soil and shielding around the MPs) was completed.

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

Other indices

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

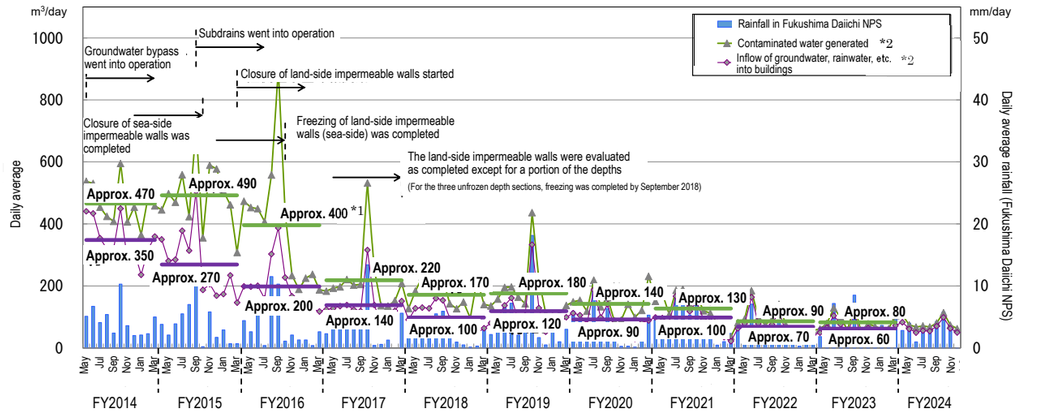
Based on the above, it was confirmed that the comprehensive cold shutdown state had been maintained and the reactors remained in a stabilized condition.

II. Progress status by each plan

Measures for contaminated water and treated water

➢ Status of contaminated water generated

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



*1 Values differ from those announced at the 20th Committee on Countermeasures for Contaminated Water Treatment (held on August 25, 2017) because the method of calculating the contaminated water volume generated was reviewed on March 1, 2018. Details of the review are described in the materials for the 50th and 51st meetings of the Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment.
*2: The monthly daily average is derived from the daily average from the previous Thursday to the last Wednesday, which is calculated based on the data measured at 7:00 on every Thursday

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

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

- At the Water-Treatment Facility Special for Subdrain & Groundwater drains, release started from September 14, 2015 and up until January 20, 2025, 2627 release operations had been conducted.
  The water quality of all temporary storage tanks satisfied the operational target.

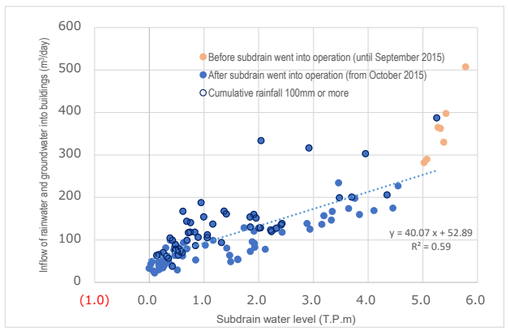


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 subdrains

➢ 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 December 2024, 96% of the planned area (1,450,000 m^2 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 December 2024, 50% of the planned area (60,000 m^2) had been completed.

➢ Status of the groundwater level around buildings

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

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

- Regarding the multi-nuclide removal system (existing), hot tests using radioactive water were conducted (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013). On March 23, 2022, an inspection prior to use certificate was granted by the Nuclear Regulation Authority (NRA) and the entire inspection prior to use was completed. For the multi-nuclide removal system (additional), an inspection prior to use certificate was granted by the NRA on October 12, 2017. Regarding the multi-nuclide removal system (high-performance), hot tests using radioactive water were conducted from October 18, 2014. In March 2, 2023, an inspection prior to use certificate was granted by the NRA and the entire inspection prior to use was completed.
- Treatment measures comprising the removal of strontium by cesium-adsorption apparatus (KURION), the secondary cesium-adsorption apparatus (SARRY) and the third cesium-adsorption apparatus (SARRY II) continued. Up until January 23, 2025, approx. 781,000 m³ had been treated.

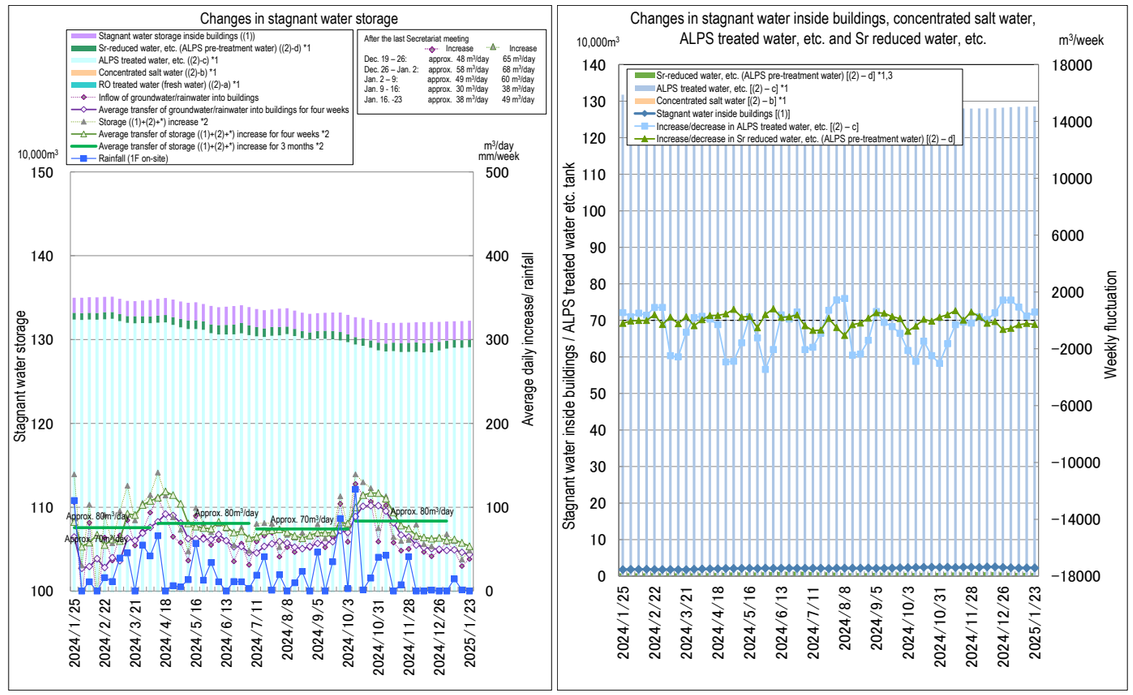
➢ Risk reduction of strontium-reduced water

- To reduce the risks of strontium-reduced water, treatment using existing, additional and high-performance multi-nuclide removal system is underway. Up until January 23, 2025, approx. 948,000 m³ had been treated.

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

- The volume of ALPS treated water, etc. was approx. 1,287,851 m³ as of January 23, 2025.
- The total volume of ALPS treated water discharged into the sea since the discharge commenced on August 24 2023 was approx. 78,285 m³ as of January 29 2025.

As of January 23, 2025



(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 January 28, 2025

Measurement object	Requirement and operation target	Measurement results	Compliance with requirement
[TEPCO] Tritium concentration in seawater (sea-area monitoring at 4 points within 3 km of the Power Station)	・Discharge suspension level: 700 Bq/L or less ・Investigation level: 350 Bq/L or less	(Sampled on January 20) ・Below the lower detection limit (less than 7.0-7.4 Bq/L)	○ ○
[TEPCO] Tritium concentration in seawater (sea-area monitoring at 1 point within 10 km square from the Power Station)	・Discharge suspension level: 30 Bq/L or less ・Investigation level: 20 Bq/L or less	(Sampled on January 20) ・Below the lower detection limit (less than 7.4 Bq/L)	○ ○
[Ministry of the Environment] Tritium concentration in seawater (at 3 points off the coast of Fukushima Prefecture)	・National safety requirement: 60,000 Bq/L ・WHO drinking water guidelines: 10,000 Bq/L	(Sampled on January 21) ・Below the lower detection limit (less than 8 Bq/L)	○ ○
[Fisheries Agency] Tritium concentration in marine products (flounder and others)	-	(Sampled on January 21) ・Below the lower detection limit (less than 7.9 Bq/kg)	○
[Fukushima Prefecture] Tritium concentration in seawater (at 9 points off the coast of Fukushima Prefecture)	・National safety requirement: 60,000 Bq/L ・WHO drinking water guidelines: 10,000 Bq/L	(Sampled on December 6) ・Below the lower detection limit (less than 3.8 – 4.2 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 January 29, 2025, 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 January 20 showed concentrations under the detection limit (less than 7.0 – 7.4 Bq/L) at all points, which was below the TEPCO operation indices of 700 Bq/L (discharge suspension level) and 350 Bq/L (investigation level).
- Regarding sea-area monitoring conducted by TEPCO at 1 point within 10 square km of the power station, quick measurements taken of the tritium concentration in the seawater sampled on January 20 showed concentrations under the detection limit (less than 7.4 Bq/L) at all points, which was below the TEPCO operation indices of 30 Bq/L (discharge suspension level) and 20 Bq/L (investigation level).
- The quick measurement results obtained by each organization were as follows:
  Ministry of the Environment: The analytical results (obtained via quick measurements) for seawater sampled on January 21 at 3 points off the coast of Fukushima Prefecture showed tritium concentrations below the lower detection limit (less than 8 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.
  Fisheries Agency: Quick analytical results for tritium in flounder sampled on January 21 showed tritium concentrations below the lower detection limit (less than 7.9 Bq/kg) in all samples.
  Fukushima Prefecture: On December 6, tritium concentrations in seawater at 9 sampling points off the coast of Fukushima Prefecture below the lower detection limit were recorded (less than 3.8 – 4.2 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.

➢ Status of responses to troubles, including body contamination, having occurred during pipe cleaning of the additional ALPS since October 2023

- Regarding four troubles such as body contamination having occurred at the additional ALPS Building since October 2023, causes and countermeasures were investigated in each trouble and a common cause analysis was conducted.
  - ✓ Body contamination during pipe cleaning of the additional ALPS (October 2023)
  - ✓ Water leakage including radioactive materials from the High-Temperature Incinerator Building (February 2024)
  - ✓ Fire alarm activation due to steam generation at the waste storage pit of the additional Radioactive Waste Incinerator (February 2024)
  - ✓ Suspension of the on-site electric power system A and a worker injury (April 2024)
- Moreover, for all on-site works, a work inspection is being conducted to assess work risks.
- In addition to the common cause analysis results based on the four troublesi mentioned and the work inspection, responses also continue to implement improvement measures extracted from the cause analysis to suspend the trial retrieval.
- As these responses continue and also to make the decommissioning safer and more effective, work to “strengthen the system and education of Operators/ Workers First” and “improve the facilities and environment” will proceed step by step to prevent troubles while prioritizing safety first.

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

- To eliminate concerns and reassure the public, a rearing test for marine organisms (flounder) in seawater with ALPS treated water added and normal seawater for comparison is underway.
- [Facility for rearing test of marine organisms (on-site)] Regarding the flounder and abalones, in both series of tanks (“normal seawater” and “diluted ALPS treated water with seawater”), no mass death or abnormality was detected (as of January 23).
- [Facility for rearing test of marine organisms (off site)] Since the rearing test using water discharged in the environment commenced, no significant change has been detected in the growth situation of flounder and abalones (as of January 23).
- Rearing of flounder and others in diluted ALPS treated water (less than 1,500 Bq/L) will continue.
- Rearing of flounder and others in water discharged into the environment will continue.
- The Organically-Bound Tritium (OBT) concentration test on flounder (less than 1,500 Bq/L) will continue.

Fuel removal from the spent fuel pools

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

➢ Main work to remove spent fuel at Unit 1

- Off site, ground assembly of the temporary gantry, upper and lower structures and box ring was completed. Ground assembly of moving roof is underway.
- 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.
- Perimeter steel frames are being removed from October 29.
- Due to the removal of the perimeter steel frames of the Unit 1 Reactor Building, the monitor trestle to monitor the extent to which radioactive dust on the operating floor was scattered showed signs of interference. In response, work to modify the dust monitor trestle is underway. Modification of two dust monitors on the north side (to the northeast and northwest) was completed in November 2024 and a further two dust monitors on the south side (to the southeast and southwest) are being manufactured (to be installed in around February 2025).

➢ Main work to remove the spent fuel at Unit 2

- Work to install a runway girder, which will support rails to be used when the fuel removal system moves between the Reactor Building and the front chamber, is underway. The runway girder consists of eight steel blocks. After being assembled off site, blocks are carried in on-site and installed in the front room of the Reactor Building. Installation commenced from October 2024 and six of eight blocks were carried into the front room.
- At the factory, trial operation related to each equipment component of the fuel removal system continues. As a specific example, using a mockup transportation cask, the operational state of the crane is verified. After the trial operation and covering the system, it will be transported by sea.

Fuel debris retrieval

➢ Unit 1 Environmental investigation inside the PCV

- In Unit 1, where the water level in the Primary Containment Vessel (PCV) is being reduced, a portion of the deposit may be exposed to the air and the level of airborne radiation dose and haze inside PCV may change.
- A summer investigation was conducted last year and as initially planned, preparation proceeds to conduct a winter investigation in February 2025.
- Affected by the outside temperature, the temperature of the PCV walls is likely to be lower in winter than summer. Accordingly, a greater difference in temperature between inside the PCV and walls is assumed, which will result in more haze being generated.
- In addition to the dose rate, temperature and images acquired in the summer investigation, a laser scan around X-2 penetration will be conducted. The specific positions of each equipment component (including the guide pipe and hand rail) will be acquired to be reflected in a future mockup training facility.
- Scope to conduct measurement under the haze environment was confirmed. However, if measurement is insufficient due to more haze than initially assumed, remeasurement will be planned separately.

➢ Unit 1 Toward a dose reduction of the RCW system heat exchanger (RCW-Hx), verification of stagnant gas inside the RCW-Hx outlet header pipe and gas purge

- The Reactor Building Cooling Water System header exchanger (RCW-Hx) installed on the second floor of the Unit 1 Reactor Building is a high-dose source and work toward dose reduction (water removal) of RCW-Hx commenced from 2022.
- Prior to sampling inclusive water of RCW-Hx (C), stagnant gas inside the RCW-Hx inlet header pipe was analyzed and highly-concentrated hydrogen gas (approx. 72%) was detected. Accordingly, gas in the RCW-Hx inlet header pipe was purged.
- There is a possibility that highly-concentrated hydrogen gas is also stagnant in the RCW-Hx outlet header pipe as in the inlet header pipe, gas will be purged after verifying the hydrogen concentration in gas inside the pipe.

- Drilling of the pipe and hydrogen gas purge will be conducted from late February 2025.
- The results acquired in the investigation will be utilized in further investigations, examination of dose reduction methods and accident investigations in 1F.

➢ Results of the non-destructive analysis (follow-up report) and preparative isolation of the fuel debris sample

- For the fuel debris sampled last year, preparative isolation was conducted after the non-destructive analysis.
- Preparative isolation of samples (stainless steel bars (approx. 250g) were hit and crushed) was conducted before transportation to each analytical institution as planned and before detailed analysis commenced.
- Within the non-destructive analysis, in the element/ compound analysis of sample surface using SEM-WDX, to acquire information on wide-ranging sample surfaces, five points were measured in separate positions on the front and rear of the sample. Uranium and iron were observed in each case. Although the fuel debris samples were uneven, the sample surface consistently showed a broad distribution of uranium.
- During the next phase, a detailed (solid and solution) analysis will be conducted over a six- to 12-month period, whereupon detailed characteristics, including the composition and crystal structure inside the fuel debris, will be assessed and analytical results compiled.

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 December 2024, the total storage volume for concrete and metal rubble was approx. 402,800 m³ (+2,400 m³ compared to the end of November with an area-occupation rate of 73%). The total storage volume of trimmed trees was approx. 70,200 m³ (a slight increase, with an area-occupation rate of 40%). The total storage volume of used protective clothing was approx. 9,200 m³ (-700 m³, with an area-occupation rate of 36%). The total storage volume of radioactive solid waste (incinerated ash and others) was approx. 38,400 m³ (a slight increase, with an area-occupation rate of 60%). The increase in rubble was due to decontamination of flanged tanks, work related to site preparation, work related to the area around the buildings of Units 1-4, etc.

➢ Management status of secondary waste from water treatment

- As of January 2, 2025, the total storage volume of waste sludge was 477 m³ (area-occupation rate: 68%), while that of concentrated waste fluid was 9,465 m³ (area-occupation rate: 92%). The total number of stored spent vessels, High-Integrity Containers (HICs) for the multi-nuclide removal system and others, was 5,839 (area-occupation rate: 87%).

Reactor cooling

The cold shutdown state will be maintained by cooling the reactor by water injection and measures to complement the status monitoring continue

➢ Status of efforts for S/C water level reduction

- For Unit 1, since March 2024, as a measure to improve the seismic resistance of the Primary Containment Vessel (PCV), the PCV Suppression Chamber (S/C) water level was reduced by reducing the reactor injection rate to around the center of the S/C.
- As a result and based on the state of PCV water level reduction, leakage from S/C is assumed to be slight if any and water reduction to around the S/C center will take time. Accordingly, the work was terminated at the end of October 2024 and the reduction trend of S/C water level has been checked while maintaining the minimum injection rate.
- Since the end of December 2024, an increase in the S/C water level reduction rate has been detected. Monitoring will continue to be reflected in the plan for S/C water level reduction.
- Moreover, as the radiation concentration in the S/C inclusive water exceeds that of the stagnant water on the basement of the Reactor Building, it is assumed that the radiation concentration of the latter will also increase. Accordingly, sampling will be conducted more frequently with that in mind.
- Regarding the cooling status of the deposit, given the lack of water at the bottom of the dry well, it is assumed that deposit is being cooled by free-flowing water (inside the pedestal) or water spreading on the PCV floor and humid environment (outside the pedestal), the state of the dry well bottom will not change, regardless of any future S/C water level reduction. Accordingly, no response such as increasing the reactor injection rate increase will be implemented and parameter monitoring will continue.

Reduction in radiation dose and mitigation of contamination

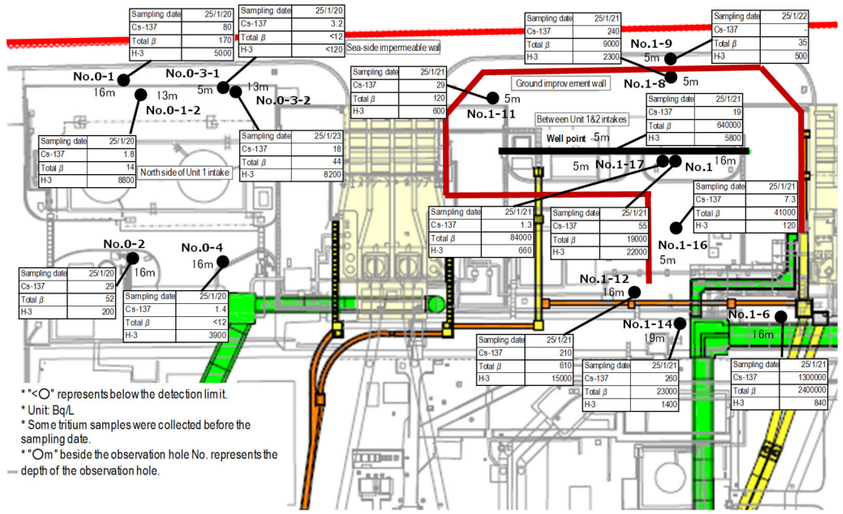
Effective dose-reduction at site boundaries and purification of port water to mitigate the impact of radiation on the external environment

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

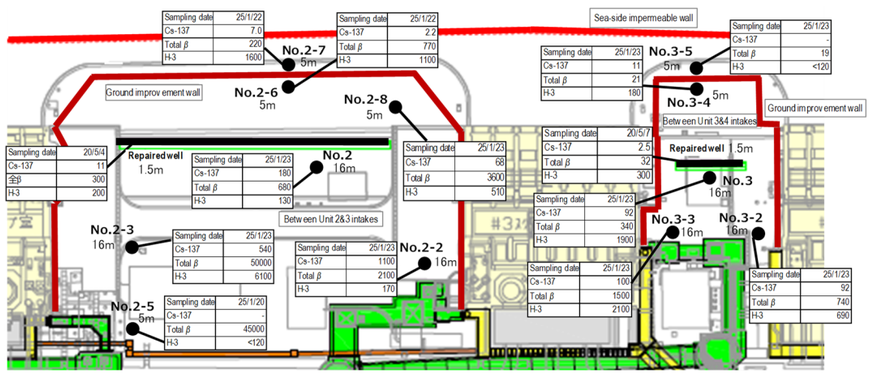
- In the Unit 1 intake north side area, the H-3 concentration was below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or has been declining overall. The concentration of total β radioactive materials has remained constant overall but increased temporarily from 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. 1-8, 1-9, 1-11, 1-12 and 1-14. The trend continues to be carefully monitored.
- In the area between the Unit 2 and 3 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has remained constant or been declining at many observation holes overall. The concentration of total β radioactive materials has remained constant overall but has been increasing 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.



<Unit 1 intake north side, between Unit 1 and 2 intakes>



<Between Unit 2 and 3 intakes, between Unit 3 and 4 intakes>

Figure 4: Groundwater concentration on the Turbine Building east side

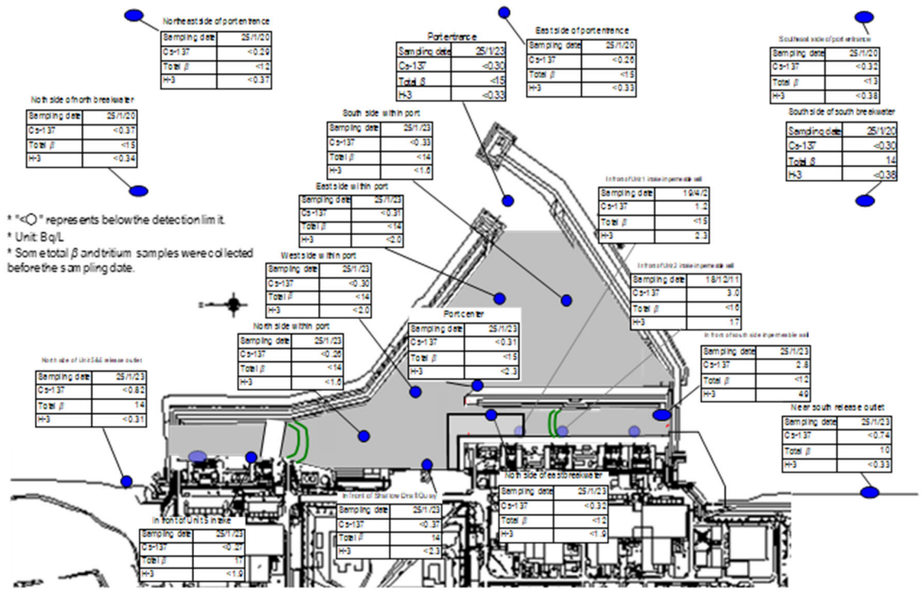


Figure 5: Seawater concentration around the port

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 September to November 2024 was approx. 9,200 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,800). 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 February 2025 (approx. 4,600 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 slightly increased and the figure for those outside remained constant. As of December 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.

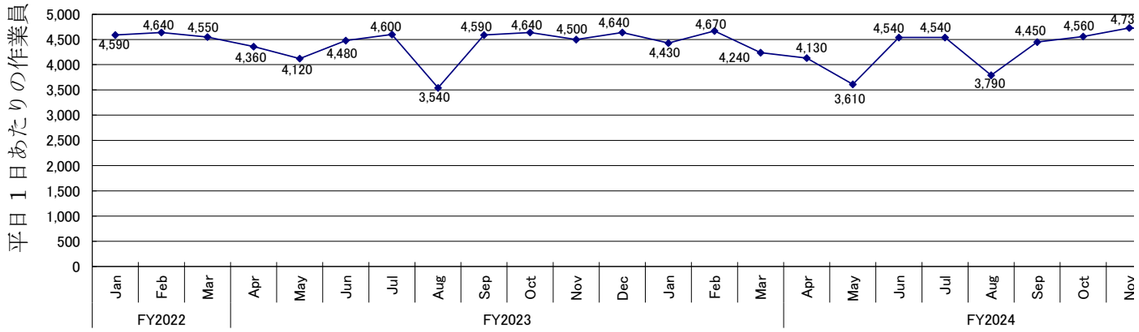


Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

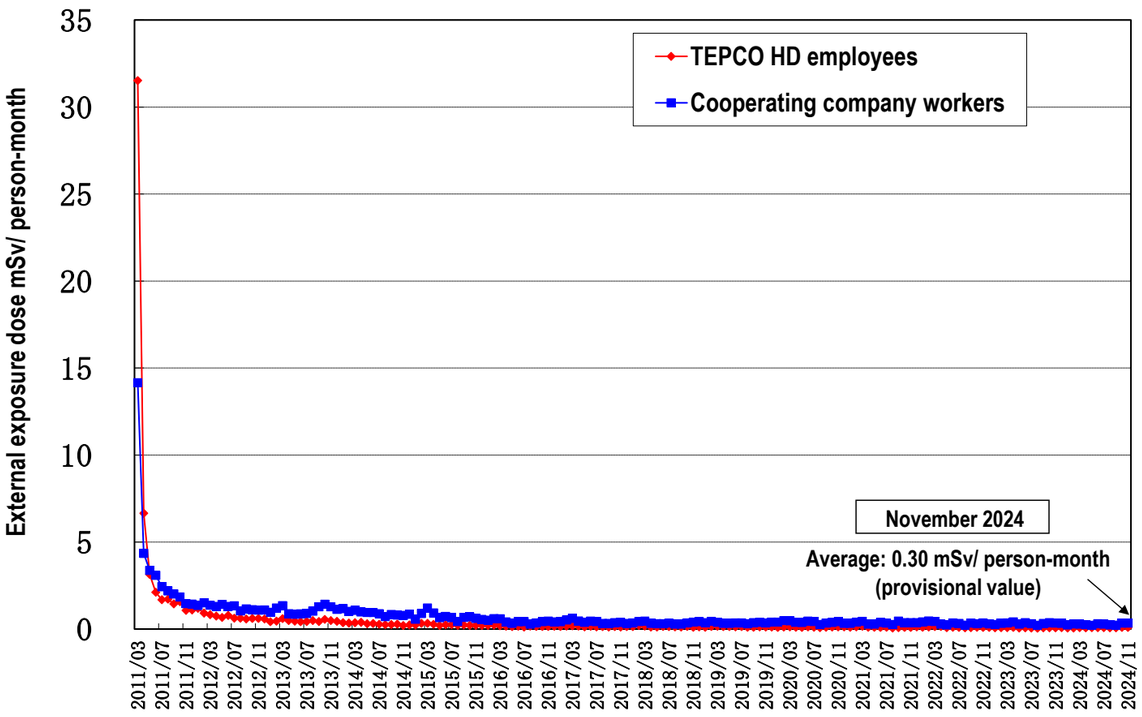


Figure 7: Changes in monthly average exposure dose of individual worker
(monthly exposure dose since March 2011)

➢ Health management of workers in the Fukushima Daiichi Nuclear Power Station

- As health management measures in line with the guidelines of the Ministry of Health, Labour and Welfare (issued in August 2015), a scheme was established and operated, whereby prime contractors confirmed reexamination at medical institutions and the subsequent status of workers who were diagnosed as requiring “detailed examination and treatment” in the health checkup, with TEPCO confirming the operation status by the prime contractors.
- The recent report on the management status of the health checkup during the 2nd quarter (July - September) in FY2024 confirmed that the prime contractors had provided appropriate guidance and managed operations properly under the scheme. The report on the follow-up status during the first quarter in FY2024 previously confirmed that responses to workers, which had not been completed by the time of the previous report, were being provided on an ongoing basis and checking of operations would continue.

➢ 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, an influenza vaccination program has been implemented since October, 2024 for TEPCO HD employees and cooperating company workers in the Fukushima Daiichi Nuclear Power Station who wish to be vaccinated. (On January 24, 2025, vaccination fi this fiscal year was finished.)

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

"The highest value" → "the latest value (sampled during January 6 - 27)"; unit (Bq/L); ND represents a value below the detection limit

Summary of TEPCO data as of January 28, 2025

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(0.35)	
Cesium-137	:	0.41	
Total β	:	15	
Tritium	:	ND(1.9)	*1

Cesium-134	:	3.3 (H25/12/24)	→	ND(0.26)	Below 1/10
Cesium-137	:	7.3 (H25/10/11)	→	ND(0.30)	Below 1/20
Total β	:	69 (H25/8/19)	→	ND(12)	Below 1/5
Tritium	:	68 (H25/8/19)	→	ND(0.33)	Below 1/200

Cesium-134	:	3.3 (H25/10/17)	→	ND(0.31)	Below 1/10
Cesium-137	:	9 (H25/10/17)	→	ND(0.34)	Below 1/20
Total β	:	74 (H25/8/19)	→	ND(14)	Below 1/5
Tritium	:	67 (H25/8/19)	→	ND(1.7)	Below 1/30

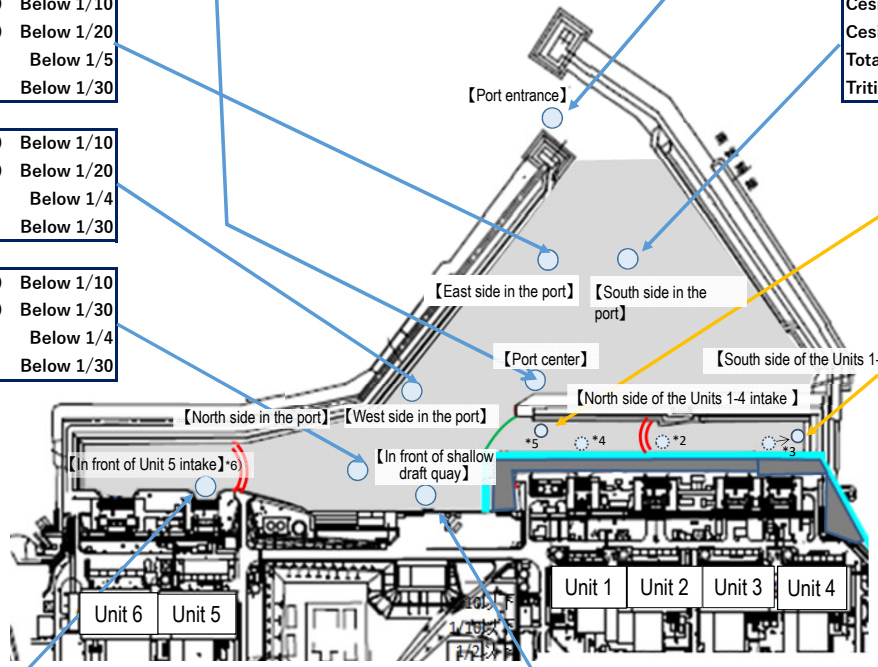
Cesium-134	:	3.5 (H25/10/17)	→	ND(0.37)	Below 1/9
Cesium-137	:	7.8 (H25/10/17)	→	ND(0.31)	Below 1/20
Total β	:	79 (H25/8/19)	→	14	Below 1/5
Tritium	:	60 (H25/8/19)	→	ND(1.4)	1/40以下

Cesium-134	:	4.4 (H25/12/24)	→	ND(0.37)	Below 1/10
Cesium-137	:	10 (H25/12/24)	→	ND(0.37)	Below 1/20
Total β	:	60 (H25/7/4)	→	ND(14)	Below 1/4
Tritium	:	59 (H25/8/19)	→	ND(1.7)	Below 1/30

Cesium-134	:	32 (H25/10/11)	→	ND(0.36)	Below 1/80
Cesium-137	:	73 (H25/10/11)	→	0.34	Below 1/200
Total β	:	320 (H25/8/12)	→	16	Below 1/20
Tritium	:	510 (H25/9/2)	→	ND(2.4)	Below 1/200

Cesium-134	:	5 (H25/12/2)	→	ND(0.29)	Below 1/10
Cesium-137	:	8.4 (H25/12/2)	→	ND(0.28)	Below 1/30
Total β	:	69 (H25/8/19)	→	ND(14)	Below 1/4
Tritium	:	52 (H25/8/19)	→	ND(1.4)	Below 1/30

Cesium-134	:	ND(0.33)	
Cesium-137	:	2.1	
Total β	:	ND(11)	
Tritium	:	37	*1



Cesium-134	:	2.8 (H25/12/2)	→	ND(0.33)	Below 1/8
Cesium-137	:	5.8 (H25/12/2)	→	ND(0.28)	Below 1/20
Total β	:	46 (H25/8/19)	→	ND(11)	Below 1/4
Tritium	:	24 (H25/8/19)	→	ND(2.4)	Below 1/10

Cesium-134	:	5.3 (H25/8/5)	→	ND(0.30)	1/10以下
Cesium-137	:	8.6 (H25/8/5)	→	0.33	1/20以下
Total β	:	40 (H25/7/3)	→	13	1/3以下
Tritium	:	340 (H25/6/26)	→	ND(1.9)	1/100以下

*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 January 6 - 27)

Summary of TEPCO data as of January 28, 2025

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

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

Cesium-134	: ND	(H25)	→	–	
Cesium-137	: ND	(H25)	→	–	
Total β	: ND	(H25)	→	–	
Tritium	: ND	(H25)	→	–	

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

Cesium-134	: ND	(H25)	→	–	
Cesium-137	: 1.6	(H25/10/18)	→	–	Below 1/2
Total β	: ND	(H25)	→	–	
Tritium	: 6.4	(H25/10/18)	→	ND(0.33)	Below 1/10

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

Cesium-134	: ND	(H25)	→	–	
Cesium-137	: ND	(H25)	→	–	
Total β	: ND	(H25)	→	–	
Tritium	: ND	(H25)	→	–	

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

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

Cesium-134	: 3.3	(H25/12/24)	→	ND(0.26)	Below 1/10
Cesium-137	: 7.3	(H25/10/11)	→	ND(0.30)	Below 1/20
Total β	: 69	(H25/8/19)	→	ND(12)	Below 1/5
Tritium	: 68	(H25/8/19)	→	ND(0.33)	Below 1/200

【Port entrance】

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

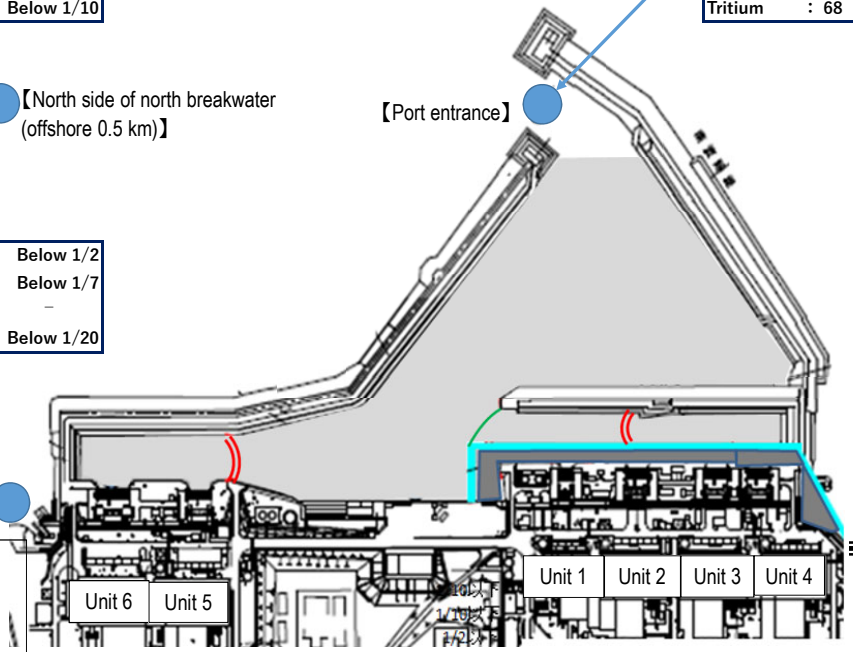
Cesium-134	: ND	(H25)	→	–	
Cesium-137	: ND	(H25)	→	–	
Total β	: ND	(H25)	→	–	
Tritium	: ND	(H25)	→	–	

Cesium-134	: 1.8	(H25/6/21)	→	ND(0.82)	Below 1/2
Cesium-137	: 4.5	(H25/3/17)	→	ND(0.57)	Below 1/7
Total β	: 12	(H25/12/23)	→	–	–
Tritium	: 8.6	(H25/6/26)	→	ND(0.31)	Below 1/20

Cesium-134	: ND	(H25)	→	ND(0.75)	
Cesium-137	: 3	(H25/7/15)	→	ND(0.82)	Below 1/3
Total β	: 15	(H25/12/23)	→	9.9	
Tritium	: 1.9	(H25/11/25)	→	ND(0.32)	Below 1/2

【North side of Unit 5 and 6 release outlet】

【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
January 30, 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
JAEA Analytical Facility Laboratory-1
K1 North
K2
K1 South
K3
K4
Temporary Cask Custody Area
High-performance multi-nuclide removal system
Main Anti-Earthquake Building
Multi-nuclide removal system
Additional multi-nuclide removal system
Measurement/ Confirmation Tank
Large equipment
Spent absorption vessel temporary storage
Vehicle screening and decontamination site
Land-side impermeable walls with frozen soil
Unit 1
Unit 2
Unit 3
Unit 4
Mega float
Okuma town
Sea side impermeable wall
H1
H2
H3
H4
H5
H6
D
E
J1
J2
J3
J4
J5
J6
J7
J8
J9
C
B
G1
G1 South
G3・G4・G5
G6
G7
Underground reservoirs
Partner Companies' Building
Groundwater bypass temporary storage tank
Common pool
2nd Cesium Adsorption Apparatus (HTI Building)
Water desalinations (RO)
Cesium absorption apparatus (Incineration Workshop Building)
Decontamination instruments (Process main Building)
3rd cesium adsorption apparatus (Onsite Bunker Building)
Onsite Bunker Building
Cesium Adsorption Vessel Temporary Storage Facility
Temporary Waste Sludge Storage
Spent Adsorption Vessel Temporary Storage Facility
Temporary rest house outside the site
New Administration Office Building
Heliport
Large rest house
Access Control Building
Water desalinations (evaporative concentration)
Water desalinations (RO)
Tank installation status
Site boundary

1st Large Waste Storage Facility

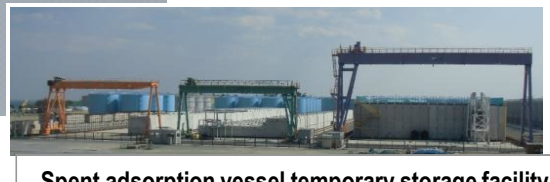
Radioactive Waste Incinerator

10th Waste Storage Facility

Volume Reduction Facility

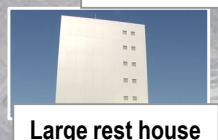
Solid Waste Storage Facility

Temporary waste sludge storage

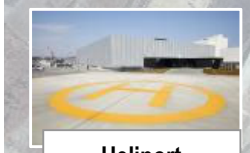


Spent adsorption vessel temporary storage facility

Access Control Building



Large rest house



Heliport

New Administration Office Building

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 "Removing" the contamination source ② "Redirecting" groundwater from the contamination source
  ③ "Preventing leakage" of contaminated water

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)

January 30, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Contaminated water management [Remove]

Contaminated water treatment facility

▽Reception start of contaminated water to Central Waste Treatment Building
▽Decontamination equipment (AREVA)
▽Evaporative concentration equipment
▽Cesium Adsorption Apparatus (KURION)
▽2nd Cesium Adsorption Apparatus (SARRY)
Cesium Adsorption Apparatus (KURION)
▽Treatment of RO-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)
▽Purification of strontium-reduced water in flanged tanks complete
▽Purification of strontium-reduced water complete
▽Reduction of strontium by 3rd Cesium Adsorption Apparatus (SARRY II) (from 2019.7.12)
▽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 (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted)
▽Multi-nuclide Removal Equipment (additional ALPS)
▽Start of full-scale operation (from 2017.10.16)
▽Multi-nuclide Removal Equipment (high performance ALPS) (from 2014.10.18, hot tests conducted)
▽Pre-service inspection granted (2023.3.2)

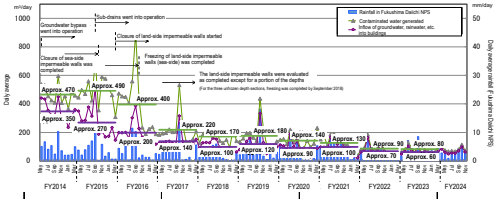

Landing of the second Cesium Adsorption Apparatus (SARRY)


Multi-nuclide removal system (ALPS)

Removal of contaminated water from seawater pipe trench

▽Trench Purification by mobile equipment
▽Completion of tunnel filling
▽Transfer of stagnant water complete
▽Completion of shaft filling
Unit 2
▽Completion of tunnel filling
▽Transfer of stagnant water complete
▽Completion of shaft filling (except for upper part of Shaft D)
【Removal of contaminated water in seawater pipe trench】
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


Unit 2 seawater pipe trench Shaft D filling work



Contaminated water management [Redirect]

Groundwater bypass


▽Installation start of groundwater bypass
▽Operation start of groundwater bypass (drainage started from 2014.5.21)
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
Pumping well
▽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


Subdrain purification system

Land-side impermeable wall brine (refrigerant) circulation pipe
▽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

▽Completion
detected from observation well of bank
▽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)

Placement of seaside impermeable walls complete

Storage facility

▽Completion of purification treatment of RO concentrated salt water
▽Storage in steel square tanks
▽Completion of replacement of steel square tanks
ntal tanks complete (except for condensed waste liquid storage tank)
▽Water leakage (300L) from flanged tank
▽Water leakage (100l) from flanged tank
▽Storage in flanged cylindrical tanks
▽Water leakage (10L) from flanged tank
▽Completion of fence to prevent leakage expanding
▽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

Flanged and 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 com

Construction of welded-joint tanks
▽Sprinkling start of rainwater within tank fences by rainwater treatment facility (from 2014.5.21)

Treatment of stagnant water

▽Start to maintain water-level difference with sub-drain water level
▽Transfer start from each building to Central Rw Building
▽Installation of stagnant water transfer equipment/transfer start
▽Completion of work to improve reliability of transfer line (replacement with PE pipes)
▽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

▽Start of marine construction
Temporary grounding of mega float▽
▽Internal filling complete (reduction of tsunami risks)

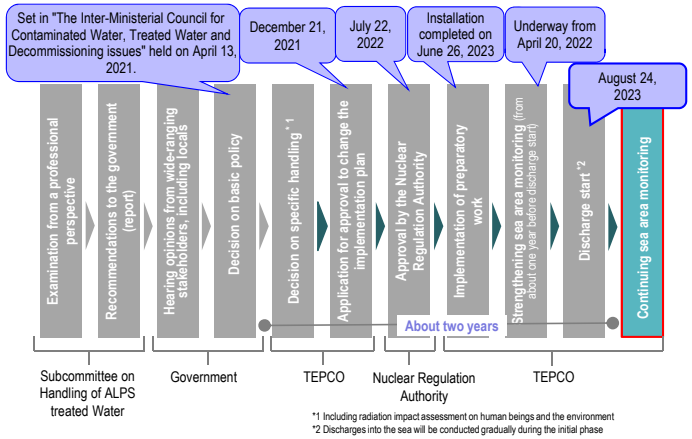

Chishima Trench Tsunami Seawall complete

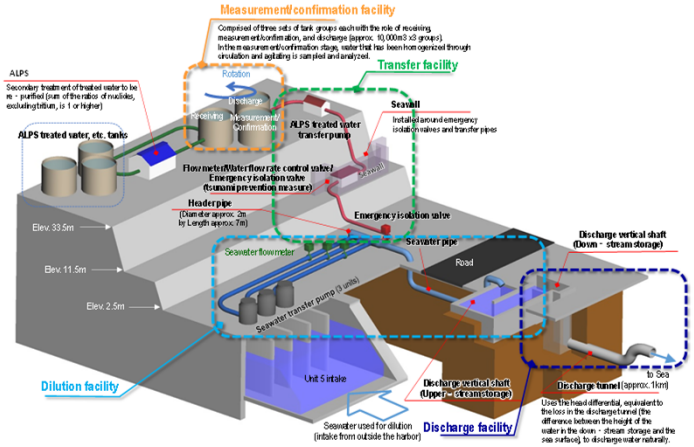
Japan Trench Tsunami Seawall

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 the pool of the Marine Organisms Raring Facility


Pool of the Marine Organisms Raring Facility

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

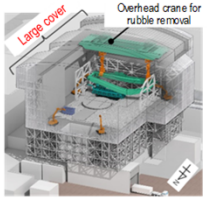
Legend: Rubble removal, etc. | Installing a fuel removal machine | Fuel removal | Storage and handling of fuel

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025～

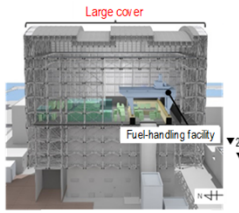
Unit 1

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

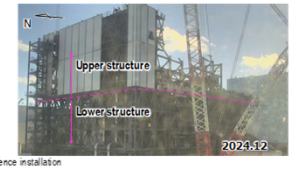
<Reference> Progress to date
Rubble removal on the north side of the operating floor started from January 2018 and has been implemented sequentially. In July and August 2019, the well plug, which was misaligned, was investigated, followed in August and September by the conditions of the overhead crane. 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 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.

<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.

▼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)
▼2024.4 Start of preparation for installing an opening
▼2024.6- Completion of installation of gantry for fuel removal
▼2024.9 Start of trial operation of ventilation equipment
▼2024.10 Start of installation of runway girder

Installation of runway girder blocks (2024.10.24)

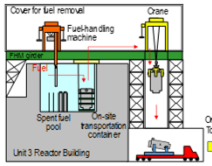
As part of efforts to remove fuel from the Unit 2 spent fuel pool and based on findings from internal operating floor investigations from November 2018 to February 2019, instead of fully dismantling the upper part of the building, the decision was made to install a small opening on the south side and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

▼2015.3-2016.11 Yard construction
▼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.

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

▼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 4

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


<Unit 4 Cover for fuel removal>


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.

▼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)

* 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)

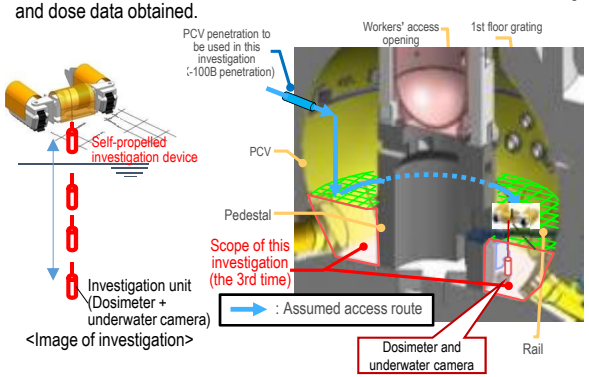
Commencement of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (From September 10, 2024, trial fuel debris retrieval commenced)

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

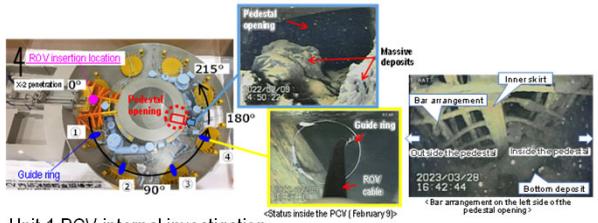
・In April 2015, a device having entered the inside of the PCV via a narrow opening (bore:φ100 mm) collected information such as images and airborne dose inside the PCV 1st floor.

・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 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)

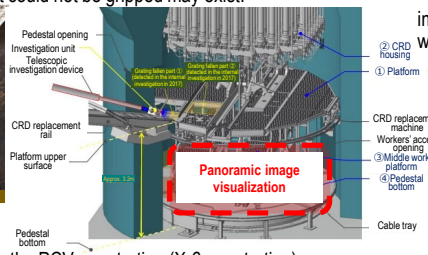
Unit 2 Investigation overview

・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)



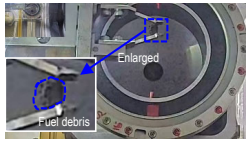
・In October 2020, deposits contact investigation the PCV penetration (X-6 penetration) was conducted. This confirmed that deposits inside the penetration had not deformed and come unstuck.

<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 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 Investigation overview

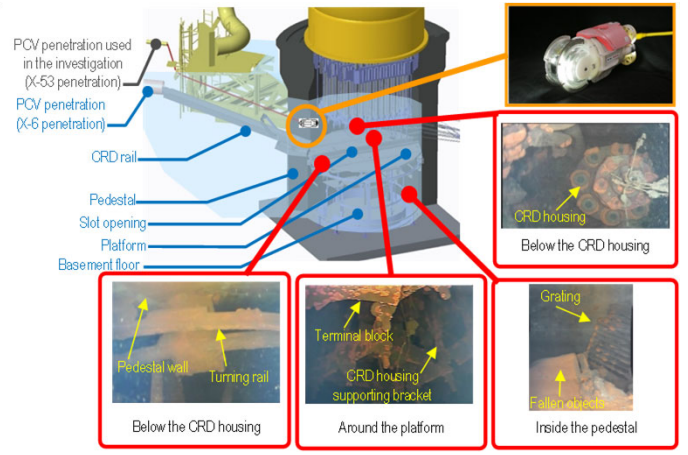
・In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, was investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.

・In October 2015, to confirm the conditions inside the PCV, an investigative device was inserted into the PCV from X-53 penetration to obtain images, data on dosage and temperature and sample stagnant water. No damage to the structure and walls inside the PCV was identified and the water level was almost identical to estimated values. In addition, the dose inside the PCV was confirmed to be lower than in other Units.

・In July 2017, the inside of the PCV was investigated using the underwater ROV (remotely operated underwater vehicle) to inspect the inside of the pedestal. Analysis of the imagery obtained in the investigation identified damage to multiple structures and the supposed core internals.

・Videos obtained in the investigation were reproduced in 3D. Based on the reproduced images, the relative positions of the structures, such as the rotating platform slipping off the rail with a portion buried in deposits, were visually understood.

<Conditions inside the pedestal>



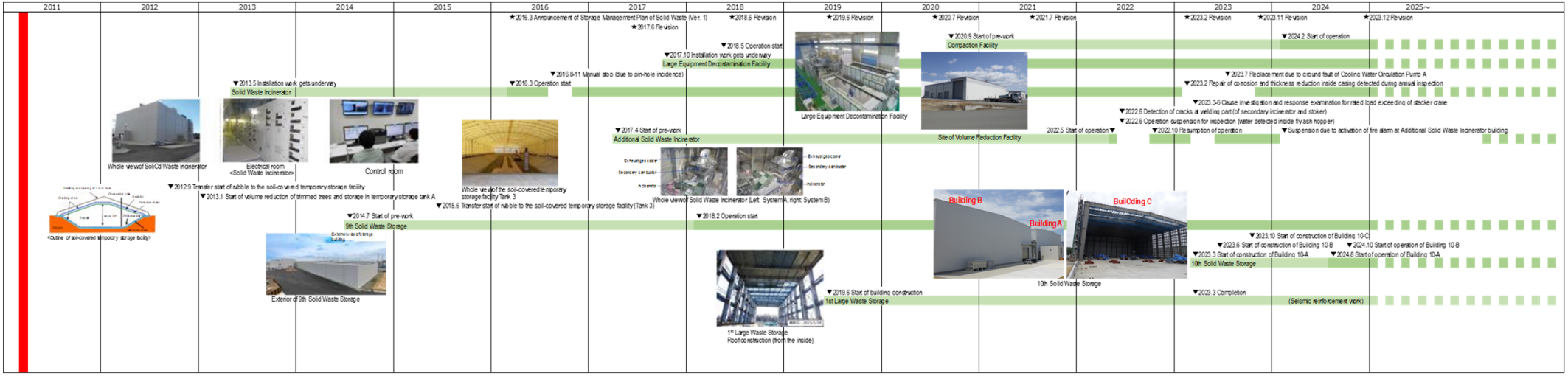
Unit 3 PCV internal investigation

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

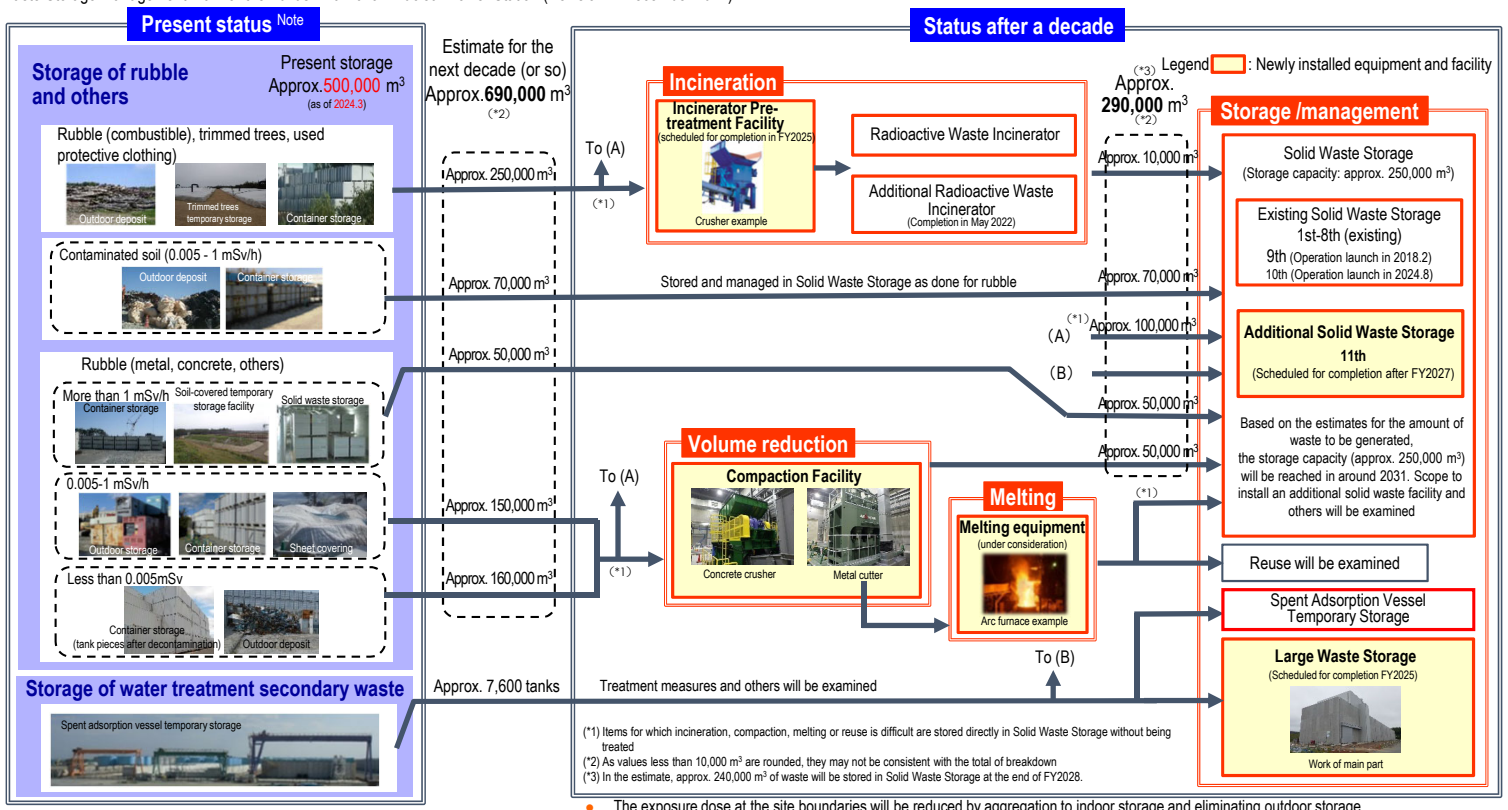
Evaluation of the location of fuel debris inside the reactor by measurement using muons
The evaluation confirmed that no large lump existed in the core area where fuel had been placed and that a portion of the fuel debris potentially existed at the bottom of the RPV. (2017.5-9)

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

Milestones of the Mid-and-Long-Term Roadmap (major target processes)
Eliminating temporary outdoor storage of rubble and others * Except for secondary waste of water treatment and materials for reuse or recycling (within FY2028)



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



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

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.

▼ 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.


External view of Access Control Facility


Large rest house under construction (2014.9.30)


Access Control Facility (2014.11.7)


Move in general working clothes (2016.1.7)

▼ 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.


Facing (2017.4.13)

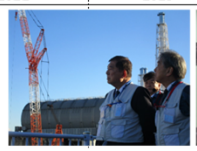
▼ In February 2017, operation started at the Partner Companies' Building next to the New Administration Office Building.

▼ 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.

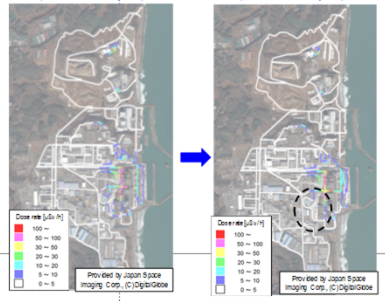

Visit by Governor of Fukushima Prefecture to the Fukushima Daiichi NPS (2018.11.1)


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




Visit by Prime Minister Ishiba to the Fukushima Daiichi NPS (2024.12.14)
(Left) Observation of the decommissioning state at high ground from which whole view of Units 1-4 can be seen
(Right) Encouragement from Prime Minister Ishiba

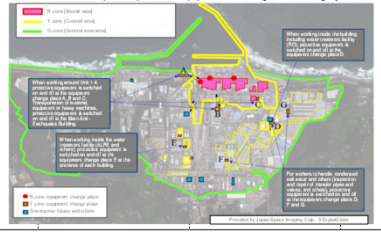
<Travel survey results of major roads within the site>
It was confirmed that compared with the last fiscal year, the dose rate has been declining on roads on the west and south sides of the High Temperature Incinerator Building (area circled by black dot line).



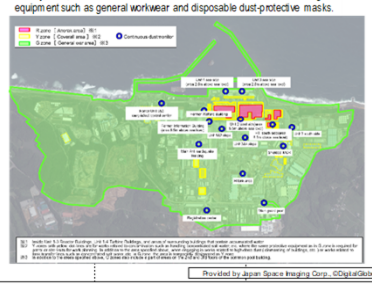
▼ In May 2013, areas excluding those around Unit 1-4, tank areas and rubble storage areas were set to full-face mask unnecessary areas.

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

▼ 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).