# Outline of Decommissioning, Contaminated Water and Treated Water Management

March 27, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

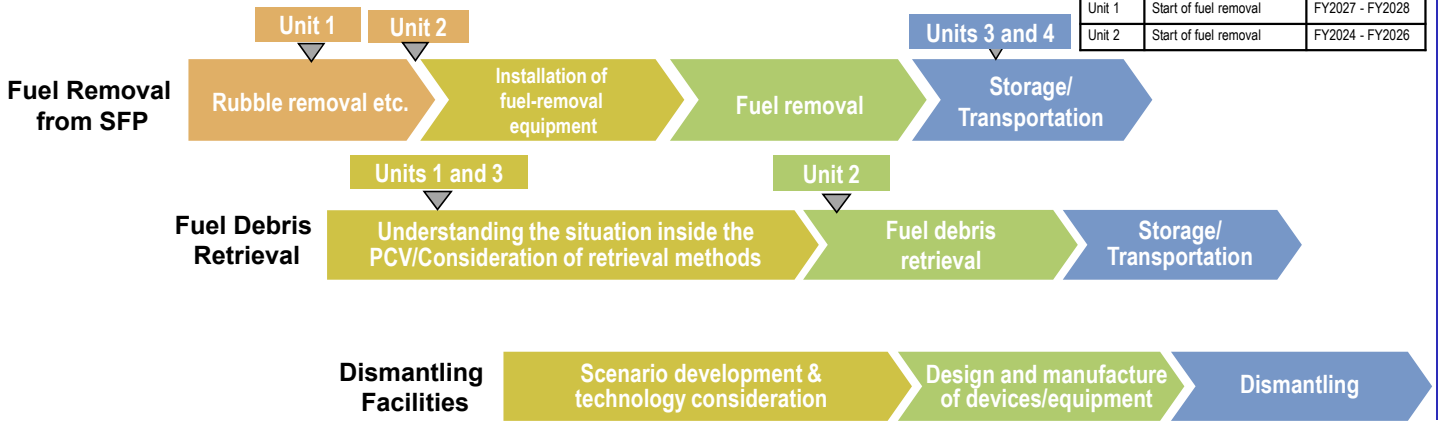
## Main decommissioning work and steps

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 |

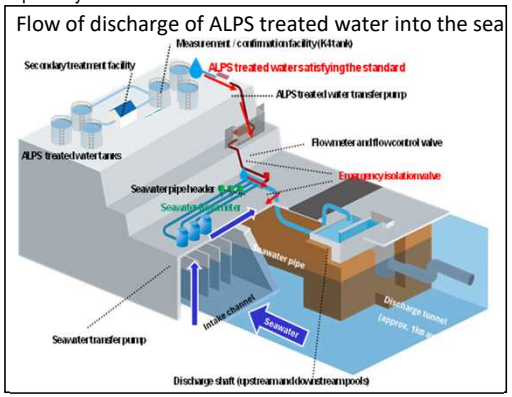



## Measures for treated water

### 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.

Flow of discharge of ALPS treated water into the sea




## Contaminated water management - triple-pronged efforts -

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

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

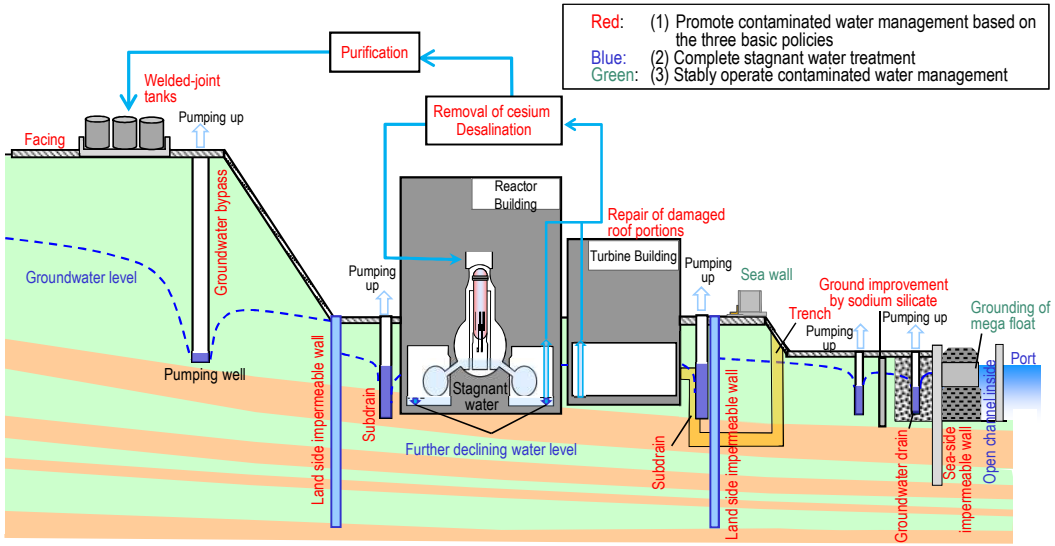
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal system) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and subdrains, have stabilized 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.

### ALPS treated water discharge status update and FY2025 discharge plan

In preparation for the seventh discharge of ALPS treated water in FY2024, the measurement/confirmation facility tank group C was analyzed. After TEPCO and the external agency confirmed that the analysis results had met discharge criteria, the results were published on March 6.

From March10, ALPS treated water was diluted with seawater, which was temporarily held in the upper - stream storage and then sampled/measured to confirm the absence of any problem (First stage). Subsequently, the water was discharged from the measurement/confirmation facility tank group C into the sea (Second stage) since March 12.

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

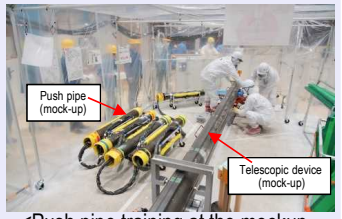
This time FY2025 discharge plan was formulated and published. There will be seven discharges during the year, each of which releasing approximately 7,800m³ for an annual discharge of approximately 54,600m³. The annual tritium discharge volume will be approximately 15 trillion Bq.

<Measurement status of the seventh discharge of ALPS treated water>
* Detailed information described on the right on Page 5

| Measurement status | Compliance with requirement |
|---|---|
| [TEPCO] Attributes of the treated water of tank group C (Concentration of the 30 types of radionuclides within the measurement / evaluation scope and regulatory requirements) (Sampled on January 14) | ○ |
| [TEPCO] Discharge shaft (upstream pool) and upstream seawater pipe (Sampled on March 25) | ○ |
| [TEPCO] Results of sea area monitoring at 4 points within 3km of the Power Station (Sampled on March 25) | ○ |
| [TEPCO] Results of sea area monitoring at 1 point within 10km square from the Power Station (Sampled on March 24) | ○ |
| [Ministry of the Environment] Seawater at 3 points the coast of Fukushima Prefecture (Sampled on February 17) | ○ |
| [Fisheries Agency] Flounder and others (Sampled on March 25) | ○ |
| [Fukushima Prefecture] Seawater at 9 points off the coast of Fukushima Prefecture (Sampled on March 21) | ○ |

### Status of preparations for the second fuel debris trial retrieval from Unit 2

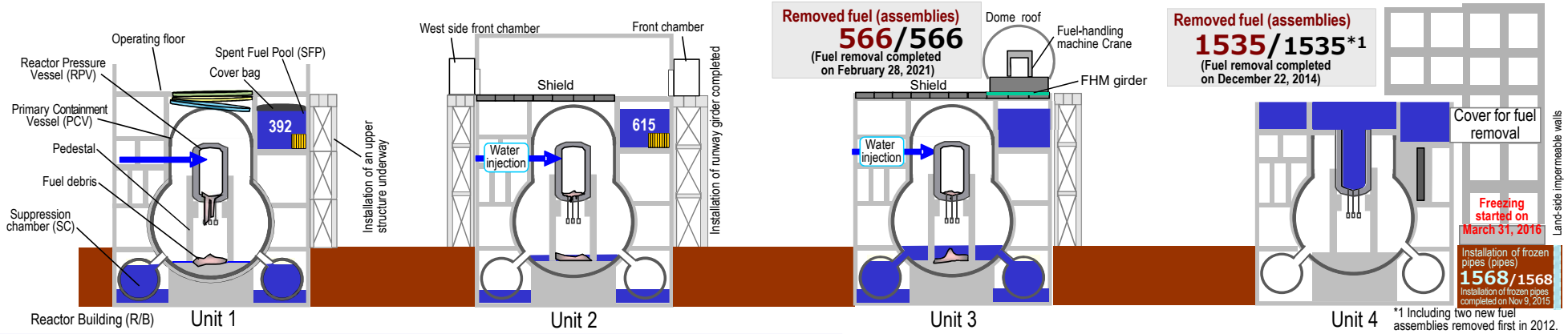
In preparation for the next fuel debris retrieval by the telescopic device, the end jig of the telescopic device has been improved and factory verification tests completed. Also, the end jig exchange training and the camera exchange training on the end of the arm were conducted in a simulated environment. Once the proficiency of the workers has been confirmed, cameras and improved end jig components will be replaced.



<Push pipe training at the mockup environment>

Moreover, using a mock-up push pipe, training was conducted on pipe installation and removal in a simulated environment.

From March 25, on-site verification is being conducted at the Fukushima Daiichi Nuclear Power Station using the actual telescopic device. TEPCO is targeting the commencement of the next fuel debris trial retrieval using the telescopic device in April.



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

### Progress status of work to collect zeolite sandbags toward treatment of stagnant water in buildings

For the Process Main Building (PMB) and the High-Temperature Incinerator Building (HTI), treatment of stagnant water is planned toward exposure of floors, before which zeolite and activated carbon sandbags will be collected.

From March 26, accumulation by remote-control using an underwater ROV* (Step 1) commenced at HTI Building. Following trial work and an underwater investigation into the implementation condition, the process will transition to continuous work. The work period until enclosure in containers will be about one year .

For enclosure in containers (Step 2), a mockup test in a larger size is underway in Tomioka Town. Improvement of issues, including visibility in muddy water, is added.

*ROV: Remotely Operated Vehicle

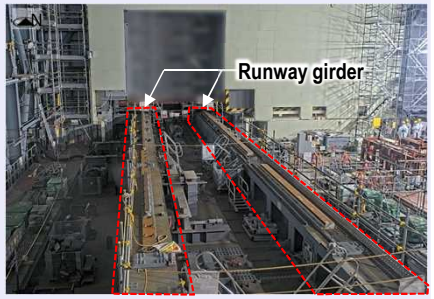

<ROV for accumulation on HTI 1st floor>
(March 5)

### Unit 2 Progress of work toward fuel removal

On March 14, work to install runway girders, which support rails to be used when the fuel removal system moves between the Reactor Building and the front chamber, was completed. During the next phase, work for ancillary equipment will be conducted toward installing the fuel removal system.

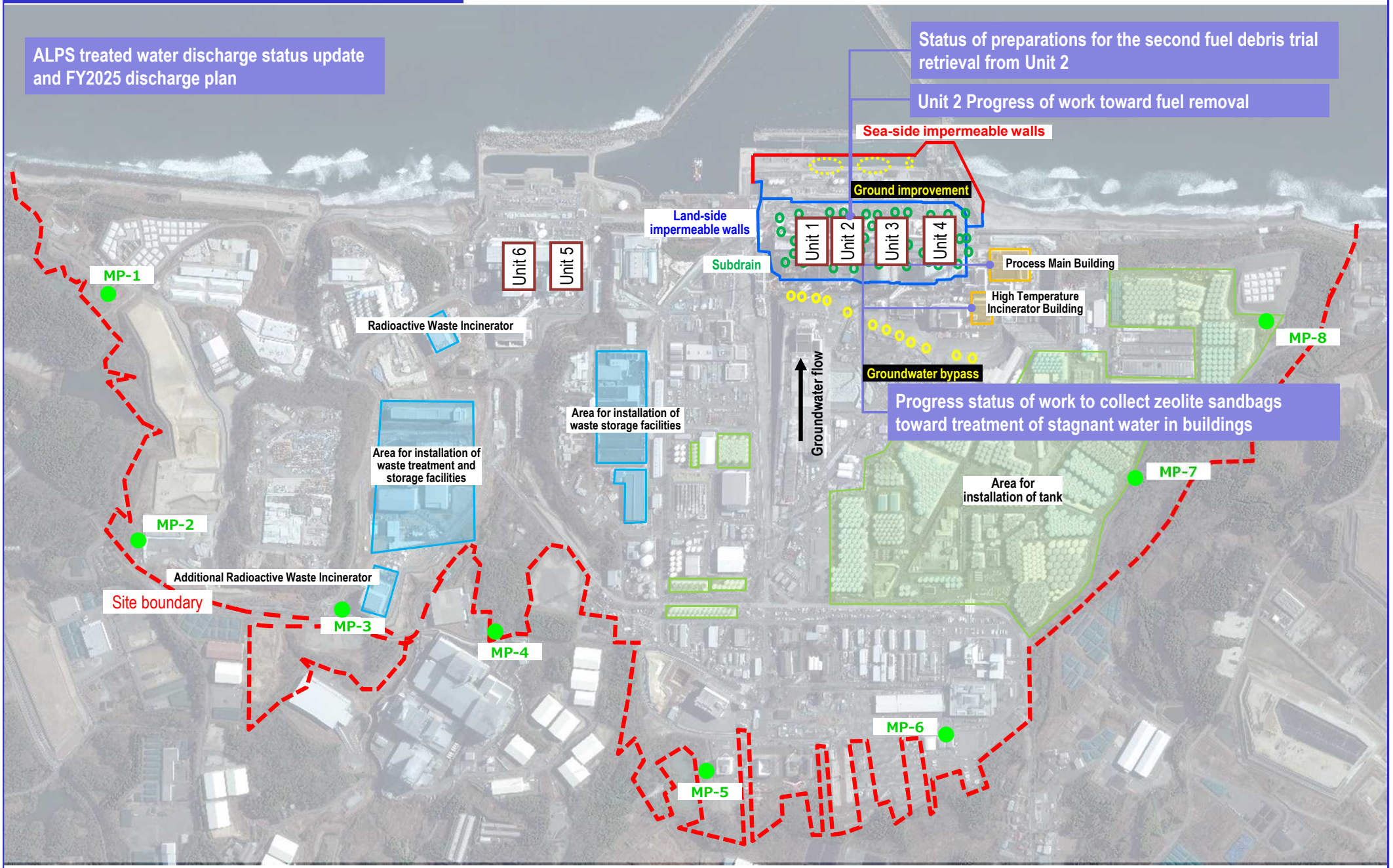
To secure visibility during fuel removal, a purification system will be installed in the spent fuel pool in April.

Toward work for the fuel removal system set to come into operation by FY2026, progress currently remains steady and work prioritizing safety will proceed.



<Installation of the runway girders>
(March 19)

# Major initiatives – Locations on site

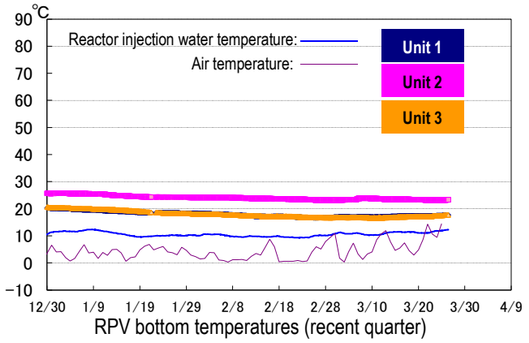



Provided by Japan Space Imaging Corp., photo taken on January 14, 2024
Product (C) [2024] Maxar Technologies.

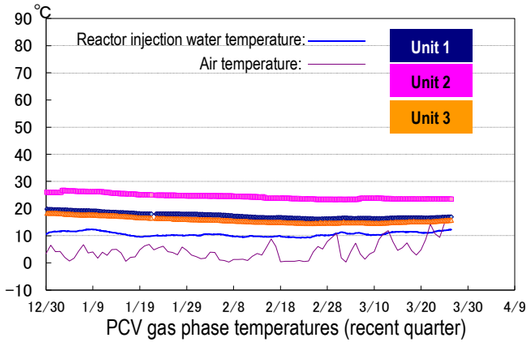
# I. Confirmation of the reactor conditions

## 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.

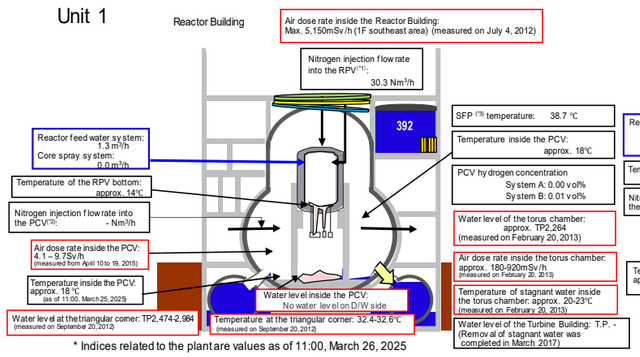


RPV bottom temperatures (recent quarter)

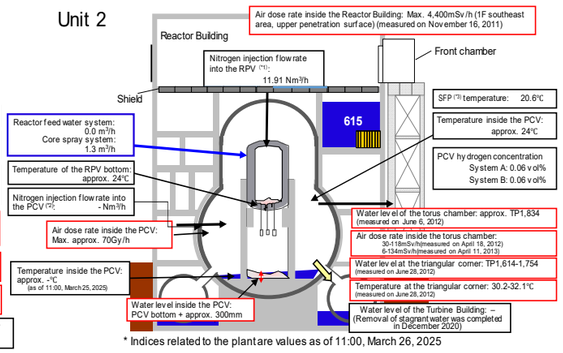


PCV gas phase temperatures (recent quarter)

*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.



* Indices related to the plant are values as of 11:00, March 26, 2025



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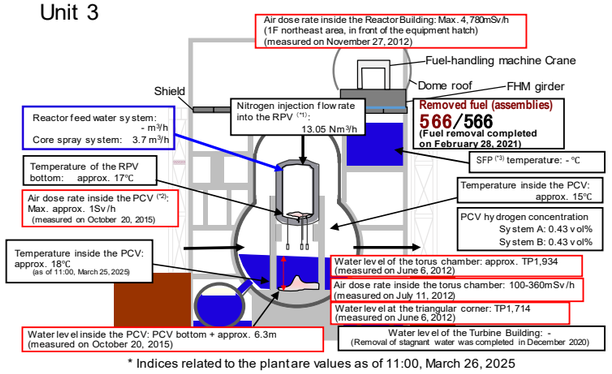


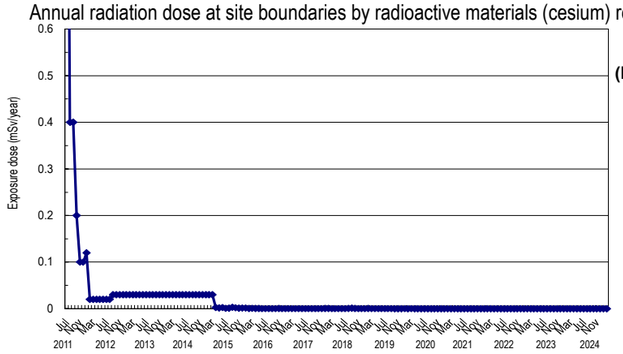
* Indices related to the plant are values as of 11:00, March 26, 2025

(*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 February 2025, the concentration of radioactive materials newly released from Reactor Building Units 1-4 into the air and measured at the site boundary was evaluated at approx. $8.8 \times 10^{-12}$ Bq/cm³ and $1.3 \times 10^{-11}$ 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]: $2 \times 10^{-5}$ Bq/cm³
  [Cs-137]: $3 \times 10^{-5}$ Bq/cm³
* Data of Monitoring Posts (MP1-MP8).
  Data of Monitoring Posts (MPs) measuring the air dose rate around the site boundary showed 0.278–0.988 μSv/h (February 26 – March 25, 2025).
  To measure the variation in the air dose rate of MP2-MP8 more accurately, work to improve the environment (trimming trees, removing surface soil and shielding around the MPs) was completed.

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

## Other indices

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

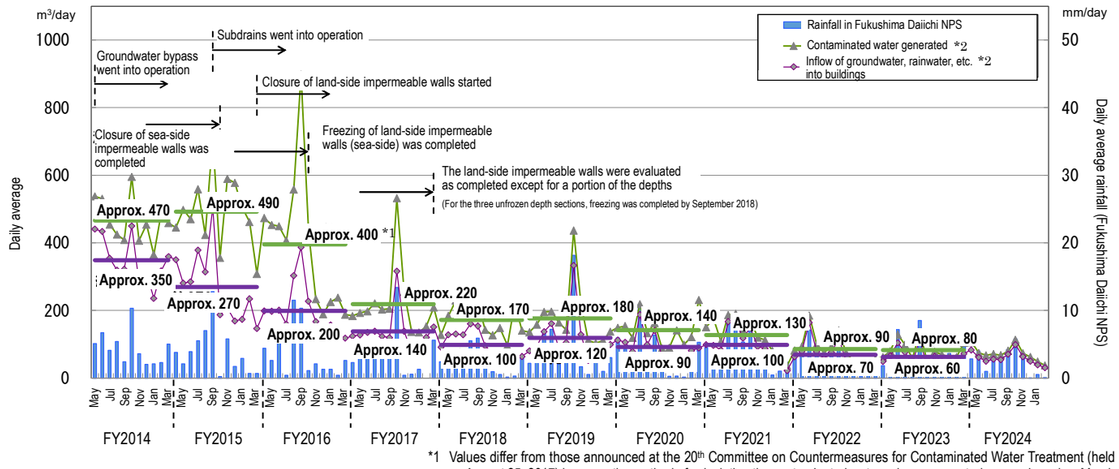
Based on the above, it was confirmed that the comprehensive cold shutdown state had been maintained and the reactors remained in a stabilized condition.

# II. Progress status by each plan

## Measures for contaminated water and treated water

### ➢ Status of contaminated water generated

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



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

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

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

- At the Water-Treatment Facility Special for Subdrain & Groundwater drains, release started from September 14, 2015, and up until March 13, 2025, 2648 release operations had been conducted.
  The water quality of all temporary storage tanks satisfied the operational target.

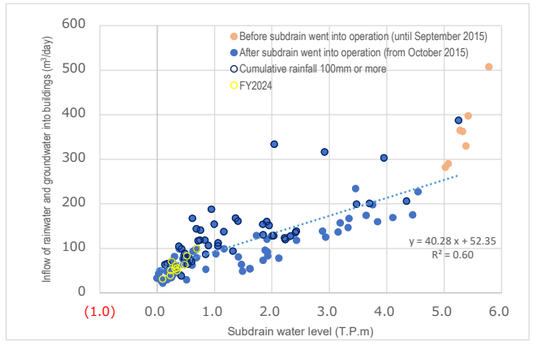



Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 subdrains

## ➢ Implementation status of facing

- Facing is a measure that involves asphalting the on-site surface to reduce the radiation dose, prevent rainwater from infiltrating the ground and reduce the amount of underground water flowing into buildings. As of the end of February 2025, 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 February 2025, 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 March 20, 2025, approx. 785,000 m³ had been treated.

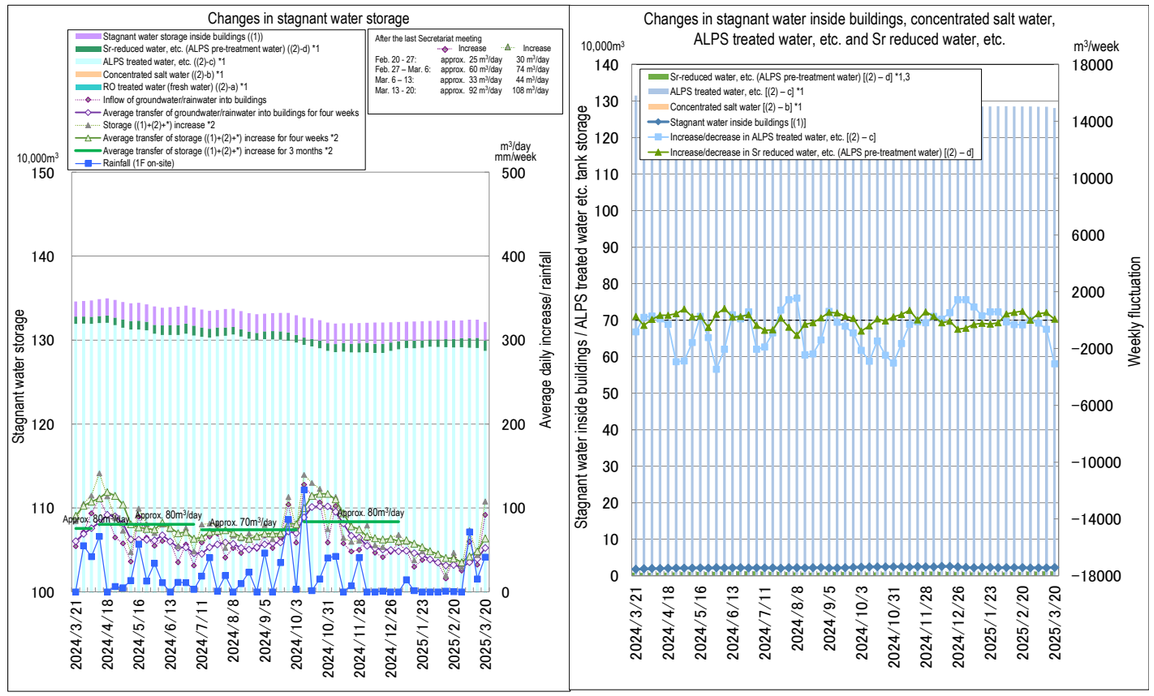
## ➢ Risk reduction of strontium-reduced water

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

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

- The volume of ALPS treated water, etc. was approx. 1,283,373 m³ as of March 20, 2025.
- The total volume of ALPS treated water discharged into the sea since the discharge commenced on August 24, 2023, was approx. 78,285 m³ as of the completion of the sixth discharge in FY2024.

As of March 20, 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 March 26, 2025

| Measurement object | Requirement and operation target | Measurement results | Compliance with requirement |
|---|---|---|---|
| [TEPCO] Tritium concentration in seawater (sea-area monitoring at 4 points within 3 km of the Power Station) | ・Discharge suspension level: 700 Bq/L or less<br>・Investigation level: 350 Bq/L or less | (Sampled on March 25)<br>・Max. 38 Bq/L | ○<br>○ |
| [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<br>・Investigation level: 20 Bq/L or less | (Sampled on March 24)<br>・Below the lower detection limit (less than 6.8 Bq/L) | ○<br>○ |
| [Ministry of the Environment] Tritium concentration in seawater (at 3 points off the coast of Fukushima Prefecture) | ・National safety requirement: 60,000 Bq/L<br>・WHO drinking water guidelines: 10,000 Bq/L | (Sampled on February 17)<br>・Below the lower detection limit (less than 8 - 9 Bq/L) | ○<br>○ |
| [Fisheries Agency] Tritium concentration in marine products (flounder and others) | - | (Sampled on March 25)<br>・Below the lower detection limit (less than 8.4 Bq/kg) | ○ |
| [Fukushima Prefecture] Tritium concentration in seawater (at 9 points off the coast of Fukushima Prefecture) | ・National safety requirement: 60,000 Bq/L<br>・WHO drinking water guidelines: 10,000 Bq/L | (Sampled on March 21)<br>・Below the lower detection limit (less than 4.0 – 4.5 Bq/L) | ○<br>○ |

- From March 12, 2025, the seventh discharge of ALPS treated water into the sea in FY2024 is being 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

March 26, 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 March 25 showed concentrations at 38 Bq/L at the nearest point (approx. 200m) from the discharge outlet and under the detection limit (less than 7.3 Bq/L) at other points, which were 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 March 24 showed concentrations under the detection limit (less than 6.8 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 February 17 at 3 sampling points the coast of Fukushima Prefecture showed tritium concentrations below the lower detection limit (less than 8 – 9 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.
  Fisheries Agency: Quick analytical results for tritium in flounder sampled on March 25 showed tritium concentrations below the lower detection limit (less than 8.4 Bq/kg) in all samples.
  Fukushima Prefecture: On March 21, tritium concentrations in seawater at 9 sampling points off the coast of Fukushima Prefecture below the lower detection limit were recorded (less than 4.0 – 4.5 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.

### ➢ Status of progress with Marine Organisms Rearing Tests and completion of the rearing tests in the Fukushima Daiichi Nuclear Power Station

- To alleviate people's concerns and cultivate peace of mind for discharging ALPS treated water into the sea, TEPCO had been rearing marine organisms using ALPS treated water diluted with seawater since September 2022. Now that all planned marine organisms rearing tests have been completed, TEPCO has summarized the report on the findings.
- [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 March 20).
- [Facility for rearing test of marine organisms (off site)] Since the rearing test using water discharged in the environment commenced, no significant change has been detected in the growth situation of flounder and abalones (as of March 20).
- The results confirmed by the rearing tests were as follows:
- Marine organisms rearing tests were conducted both in "normal seawater" and in "diluted ALPS treated water with seawater". The growth conditions of the marine organisms in the respective environments were compared based on the rearing data and confirmed to have no significant differences.
- TEPCO confirmed that "tritium is not concentrated in the living bodies and that the concentration of tritium in living bodies does not exceed that of the rearing environment" as demonstrated in previous knowledge.
- Flounders and abalones that were being raised in normal seawater were put in "water discharged into the environment" and TEPCO confirmed that there was no remarkable change in the growth of the flounders or abalones around this time. Flounder and abalone were reared in water discharged into the environment for approximately six months and we confirmed that there is no change in the growth of them.
- Since all planned Marine Organisms Rearing Tests have been completed, the rearing tests will be finished as of March 31, 2025.
- In conjunction with the completion of rearing tests, updates on the rearing log and YouTube live stream will be stopped from March 31, 2025.

### ➢ Status of responses to stagnant water in on-site trenches

- There are 97 trenches around Units 1-4, within which the stagnant water is periodically inspected to determine its condition. Moreover, taking concentrations of radioactive materials in stagnant water, the amount of stagnant water and on-site conditions into account, responses including removing and filling of stagnant water and so on have been taken sequentially.
- For trenches investigated before FY2021, measures have continued based on the milestone of "removing stagnant water on-site (removing and transferring water including radioactive materials) by the end of March 2025" and 87 trenches were completed.
- Among the trenches to be investigated after FY2022 (10 trenches), investigation and removal of stagnant water will continue for 8 trenches and investigation will be investigated after mockup tests and improving the environment for 2 high-dose trenches.

## 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.*

### ➢ Progress toward work to remove spent fuel at Unit 1

- Before installing a large cover over the Reactor Building, ground assembly of steel frames in the off-site yard and installation on-site are both underway.
- In the off-site yard, ground assembly of the temporary gantry, upper and lower structures and box ring was completed. Ground assembly of the moving roof is underway. On-site, the installation of the upper structure is underway.
- For Unit 1, prior to fuel removal, rubble will be removed inside the large cover. To avoid the risk of the auxiliary hoist of the fuel handling machine falling during rubble removal, an additional cover will be installed over the spent fuel pool (SFP) gate.
- During the mockup test, it was confirmed that even if the auxiliary hoist fell over the additional cover, it would not affect the SFP gate. Installing a large cover box ring would prevent the cover from being carried in. Accordingly, installation of an additional cover over the SFP gate will commence from around April 2025 before installing the box ring.
- Installation of the large cover upper structure will complicate SFP water injection using a concrete pump truck. Accordingly, to diversify the water injection means in addition to the existing water injection using the SFP cooling facility, a new means of water injection (alternative water injection line) was installed.

### ➢ Main work to remove the spent fuel at Unit 2

- On March 14, work to install runway girders, which support the rails to be used when the fuel removal system moves between the Reactor Building and the front chamber, was completed. During the next phase, work on ancillary equipment will be conducted toward installing the fuel removal system.
- To ensure visibility during fuel removal, a purification system will be installed in the spent fuel pool in April.
- Progress toward work for the fuel removal system to be commenced by FY2026 remains steady at present and work prioritizing safety will proceed.

## Fuel debris retrieval

### ➢ Results to confirm stagnant gas inside the Unit 1 RCW outlet header pipe and commencement of gas purge

- Given that the heat exchanger of the Reactor Building Cooling Water System (RCW-Hx) installed on the 2nd floor of the Unit 1 Reactor Building is a high-dose source, work to reduce the dose in RCW-Hx (by removing water and others) commenced from 2022.
- Prior to purging the stagnant gas inside the RCW-Hx outlet header pipe, to confirm the hydrogen concentration of gas inside the pipe, electrolytic drilling of the pipe was conducted from March 6 and penetration of the pipe was confirmed on March 13.
- Gas was sampled from the pipe penetration on March 17 and a hydrogen concentration of approx. 19% was confirmed.
- It was confirmed that the stagnant concentration of hydrogen gas inside the pipe was within the flammable range (4 - 75%). Stagnant gas inside the pipe was diluted using nitrogen and discharged via the HEPA filter. From March 28, 2025, a gas purge was conducted.
- Discharge of stagnant gas (Kr-85 and Cs-137) in association with purge will be evaluated by the effective dose at the site boundaries and will remain within a low value (approx. $2.1\times10^{-7}$ mSv). Accordingly, the risk of radiation exposure affecting the surrounding public is sufficiently low.

## 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 February 2025, the total storage volume for concrete and metal rubble was approx. 404,800 m³ (a slight increase compared to the end of January with an area-occupation rate of 73%). The total storage volume of trimmed trees was approx. 70,300 m³ (a slight increase, with an area-occupation rate of 40%). The total storage volume of used protective clothing was approx. 10,200 m³ (+900 m³, with an area-occupation rate of 40%). 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 work related to site preparation, decontamination of flanged tanks and work related to the area around the buildings of Units 1-4, etc.

### ➢ Management status of secondary waste from water treatment

- As of March 6, 2025, the total storage volume of waste sludge was 471 m³ (area-occupation rate: 67%), while that of concentrated waste fluid was 9,462 m³ (area-occupation rate: 92%). The total number of stored spent vessels, High-Integrity Containers (HICs) for the multi-nuclide removal system and others, was 5,867 (area-occupation rate: 88%).

### ➢ Update of the Solid Waste Analysis Plan Toward Decommissioning of the TEPCO Fukushima Daiichi Nuclear Power Station (FY2025)

- To strategically determine the characteristics of waste and secure the necessary analytical capability (analytical facilities, human resources and others), the “Solid Waste Analysis Plan Toward Decommissioning of the TEPCO Fukushima Daiichi Nuclear Power Station” was formulated in 2023. Since then, reflecting changing analytical needs and a policy of determining the characteristics aligned with the progress of decommissioning, the analysis plan has been annually updated.
- This time, reflecting the latest examination status, the decommissioning process and others for the targets set in the “Target Map to Reduce Mid-term Risks of the TEPCO Fukushima Daiichi Nuclear Power Station,” the FY2025 Solid Waste Analysis Plan was formulated.
- In cooperation with the national government, JAEA and NDF, preparation for the analysis facilities, enhancing the analytical capability and developing and securing human resources will continue.

## Reactor cooling

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

### ➢ Exclusion of a portion of the Unit 1 PCV thermometers for monitoring

- To strengthen the emission suppression of radioactive materials (dust) inside the PCV, the “test toward strengthening the PCV-exclusion function” was conducted from November 1 to 28, 2023.
- The test confirmed the characteristic whereby if the intake and exhaust flow balance was changed, a portion of the indicated values of the PCV thermometer were changed and locally significant increase rates were detected.
- Based on the examination results on the change in thermometer-indicated values, it was determined from an engineering perspective that TE-1625H (HVH-12C) which marked an exceptionally significant temperature change, did not show the actual temperature change (affected by the change of the intake and exhaust flow balance).
- Given the scope for phenomena not representing actual temperature changes to be regarded as such, three thermometers that marked changes exceeding the criteria of uncertainty (approx. 20℃) were excluded from monitoring (and treated as benchmark references) from March 11, 2025, 0:00.
- Multiple other thermometers recorded changes in indicated values during the test but were considered to have less impact on temperature monitoring. Accordingly, monitoring of these thermometers will continue.

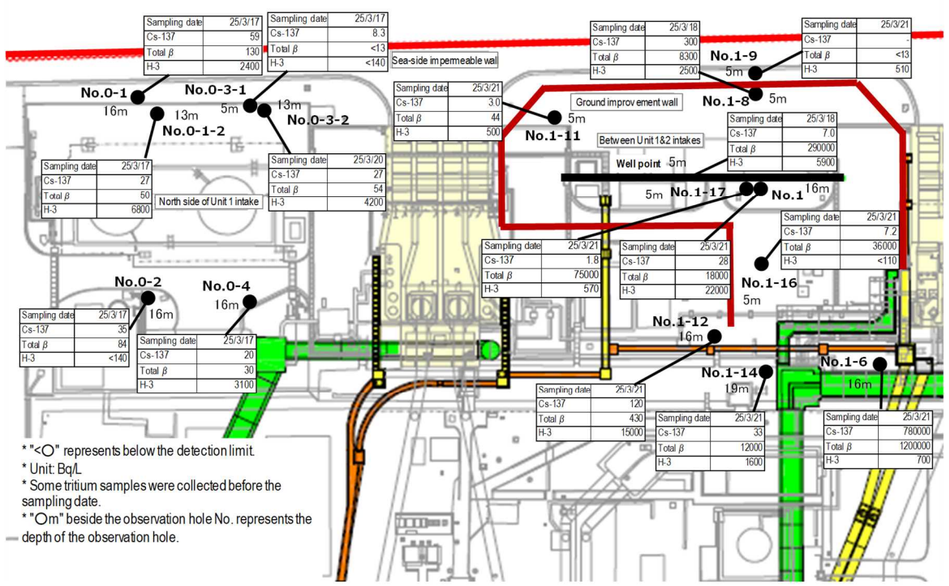
## Reduction in radiation dose and mitigation of contamination

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

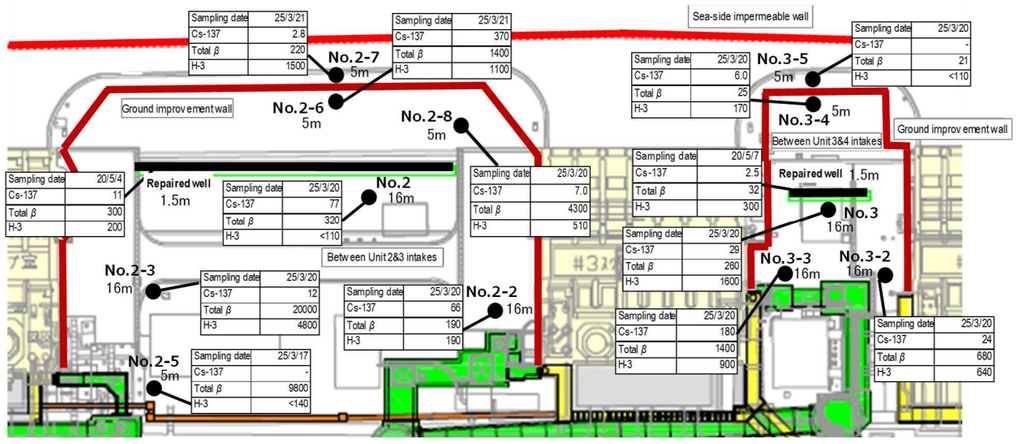
### ➢ Status of the groundwater and seawater on the east side of Turbine Building Units 1-4

- 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 $\beta$ radioactive materials has remained constant overall but increased temporarily from April 2020 and is even currently increasing or declining at a low concentration at observation holes including Nos. 0-1, 0-1-2, 0-2, 0-3-1, 0-3-2 and 0-4. The trend continues to be carefully monitored.
- In the area between the Units 1 and 2 intakes, the H-3 concentration has remained below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing or declining at Nos. 1-14 and 1-17 but has otherwise remained constant or been declining overall. The concentration of total $\beta$ 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 $\beta$ radioactive materials has remained constant overall but has been increasing and larger fluctuation was seen at No. 2-5. The trend continues to be carefully monitored.
- In the area between the Unit 3 and 4 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or been declining overall. The concentration of total $\beta$ 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 $\beta$ 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 $\beta$ 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

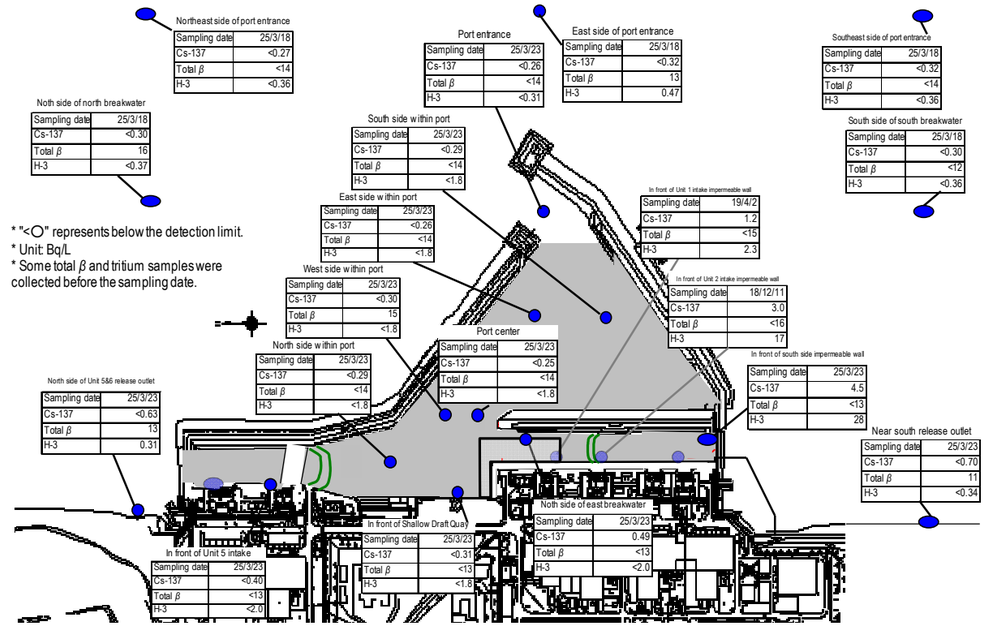



Figure 5: Seawater concentration around the port

## 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 November 2024 – January 2025 was approx. 9,200 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,900). Accordingly, sufficient personnel were registered to work on site.
- It was confirmed with the prime contractors that the estimated manpower necessary for the work in April 2025 (approx. 4,700 workers per day: cooperating company workers and TEPCO HD employees) would be secured at present. The average numbers of workers per day per month (actual values) for the most recent two years were maintained, at approx. 3,500 to 4,900.
- The number of workers from both within and outside Fukushima Prefecture remained constant. As of February 2025, the local employment ratio (cooperating company workers and TEPCO HD employees) remained constant at around 70%.
- The average exposure doses of workers were approx. 2.51, 2.16 and 2.18 mSv/person-year during FY2021, 2022 and 2023, respectively (The legal exposure dose limits are 100 and 50 mSv/person-year respectively over five years, the TEPCO HD management target is 20 mSv/person-year).
- For most workers, the exposure dose remained sufficiently within the limit and allowed them to continue engaging in radiation work.

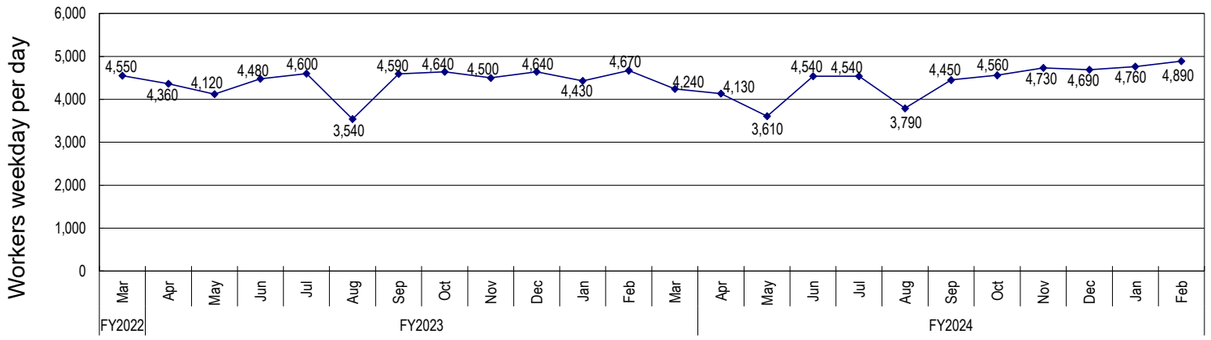



Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

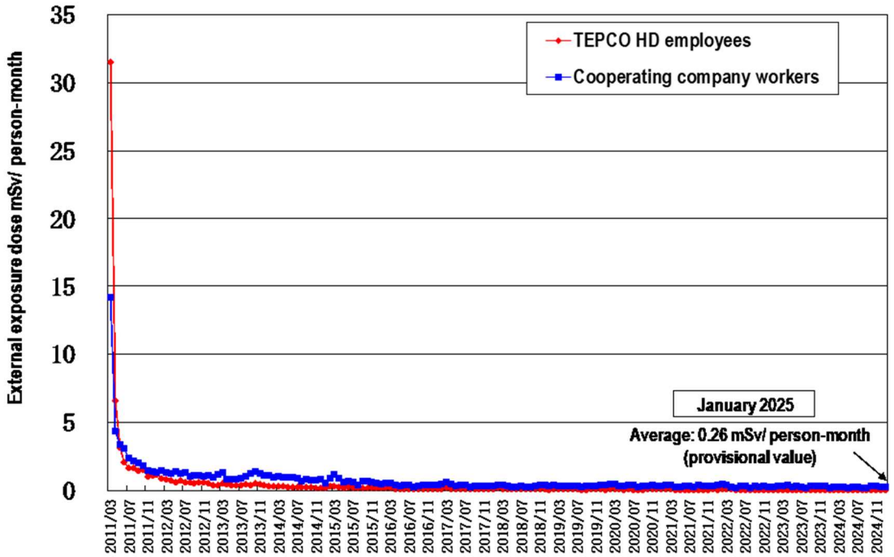



Figure 7: Changes in monthly average exposure dose of individual worker
(monthly exposure dose since March 2011)

## ➢ Countermeasures for infectious diseases

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

Others

## ➢ Construction of the Radioactive Material Analysis and Research Facility Laboratory-2

- At the Japan Atomic Energy Agency (JAEA), toward decommissioning of the Fukushima Daiichi Nuclear Power Station, the Radioactive Material Analysis and Research Facility, which engages in research and development through third-party analysis of ALPS treated water and determining characteristics of fuel debris, is constructed and operated.
- At the Radioactive Material Analysis and Research Facility Laboratory-2 in preparation for construction, high-dose samples such as fuel debris will be analyzed.
- The application for change in the implementation plan was approved on December 18, 2024, prior understanding by the relevant local authorities was obtained on March 25, 2025, and construction will commence when preparation is completed.

## ➢ Mid-and-Long-Term Decommissioning Action Plan 2025

- The “Mid-and-Long-Term Decommissioning Action Plan” has been formulated to indicate the main work processes involved in decommissioning as a whole and achieve the milestones laid out in the Mid-and-Long-Term Roadmap and the Risk Map of the Nuclear Regulation Authority (NRA). Based on FY2024 progress, the plan was revised.
- Points of the revision in the Mid-and-Long-Term Decommissioning Action Plan 2025 include reflecting trial retrieval work of Unit 2 fuel debris and describing detailed work of the PCV internal investigation.
- Based on the Mid-and-Long-Term Decommissioning Action Plan 2025, procurement plan will be formulated and proceed toward expanding participation of local companies and providing more procurement.

# 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 March 1 - 24)"; unit (Bq/L); ND represents a value below the detection limit**

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

**Summary of TEPCO data as of March 25, 2025**

| | | | | |
|---|---|---|---|---|
| Cesium-134 | : | ND(0.35) | | |
| Cesium-137 | : | 0.51 | | |
| Total β | : | ND(11) | | |
| Tritium | : | ND(1.9) | | *1 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 3.3 (H25/12/24) | → | ND(0.33) | Below 1/10 |
| Cesium-137 | : | 7.3 (H25/10/11) | → | ND(0.26) | Below 1/20 |
| Total β | : | 69 (H25/8/19) | → | 12 | Below 1/5 |
| Tritium | : | 68 (H25/8/19) | → | ND(0.31) | Below 1/200 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 3.3 (H25/10/17) | → | ND(0.40) | Below 1/8 |
| Cesium-137 | : | 9 (H25/10/17) | → | ND(0.29) | Below 1/30 |
| Total β | : | 74 (H25/8/19) | → | 13 | Below 1/5 |
| Tritium | : | 67 (H25/8/19) | → | ND(1.8) | Below 1/30 |

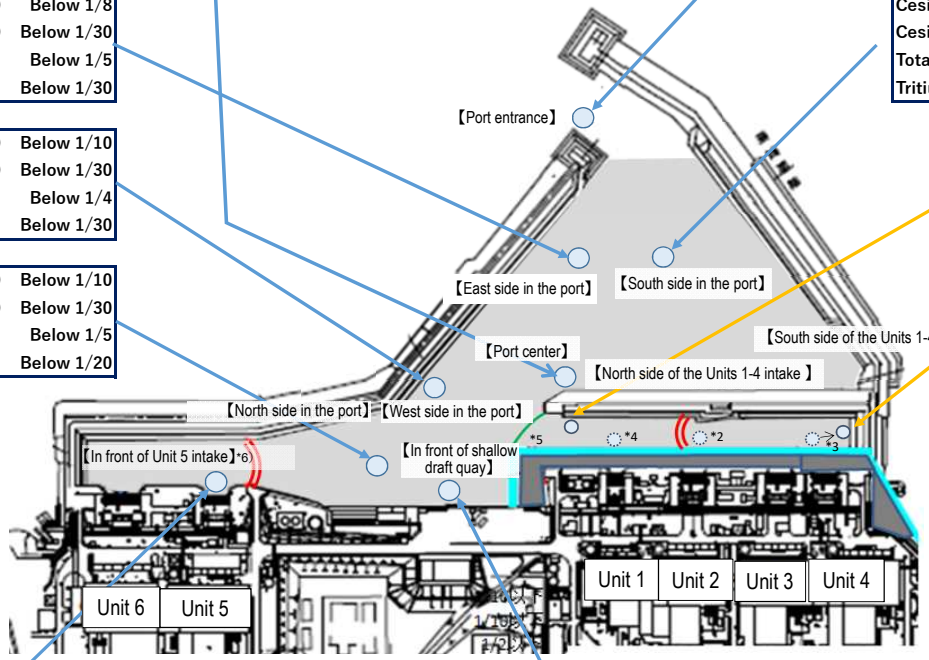
| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 3.5 (H25/10/17) | → | ND(0.29) | Below 1/10 |
| Cesium-137 | : | 7.8 (H25/10/17) | → | ND(0.32) | Below 1/20 |
| Total β | : | 79 (H25/8/19) | → | ND(13) | Below 1/6 |
| Tritium | : | 60 (H25/8/19) | → | ND(1.8) | Below 1/30 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 4.4 (H25/12/24) | → | ND(0.28) | Below 1/10 |
| Cesium-137 | : | 10 (H25/12/24) | → | ND(0.31) | Below 1/30 |
| Total β | : | 60 (H25/7/4) | → | ND(13) | Below 1/4 |
| Tritium | : | 59 (H25/8/19) | → | ND(1.8) | Below 1/30 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 32 (H25/10/11) | → | ND(0.34) | Below 1/90 |
| Cesium-137 | : | 73 (H25/10/11) | → | 0.71 | Below 1/100 |
| Total β | : | 320 (H25/8/12) | → | ND(13) | Below 1/20 |
| Tritium | : | 510 (H25/9/2) | → | 2.4 | Below 1/200 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 5 (H25/12/2) | → | ND(0.32) | Below 1/10 |
| Cesium-137 | : | 8.4 (H25/12/2) | → | ND(0.28) | Below 1/30 |
| Total β | : | 69 (H25/8/19) | → | 13 | Below 1/5 |
| Tritium | : | 52 (H25/8/19) | → | ND(1.8) | Below 1/20 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | ND(0.30) | | | |
| Cesium-137 | : | 4.2 | | | |
| Total β | : | ND(13) | | | |
| Tritium | : | 32 | | | *1 |




| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 2.8 (H25/12/2) | → | ND(0.31) | Below 1/9 |
| Cesium-137 | : | 5.8 (H25/12/2) | → | ND(0.34) | Below 1/10 |
| Total β | : | 46 (H25/8/19) | → | 13 | Below 1/3 |
| Tritium | : | 24 (H25/8/19) | → | ND(2.2) | Below 1/10 |

| | | | | | |
|---|---|---|---|---|---|
| Cesium-134 | : | 5.3 (H25/8/5) | → | ND(0.27) | Below 1/10 |
| Cesium-137 | : | 8.6 (H25/8/5) | → | ND(0.33) | Below 1/20 |
| Total β | : | 40 (H25/7/3) | → | ND(13) | Below 1/3 |
| Tritium | : | 340 (H25/6/26) | → | ND(1.9) | Below 1/100 |

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

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

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

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

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

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

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

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

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

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

(The latest values sampled during March 1 - 24)

Summary of TEPCO data as of March, 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) → | _ | _ |

【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) → | _ | _ |

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

| | | | |
|---|---|---|---|
| Cesium-134 | 3.3 (H25/12/24) → | ND(0.33) | Below 1/10 |
| Cesium-137 | 7.3 (H25/10/11) → | ND(0.26) | Below 1/20 |
| Total β | 69 (H25/8/19) → | 12 | Below 1/5 |
| Tritium | 68 (H25/8/19) → | ND(0.31) | Below 1/200 |

【Port entrance】

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

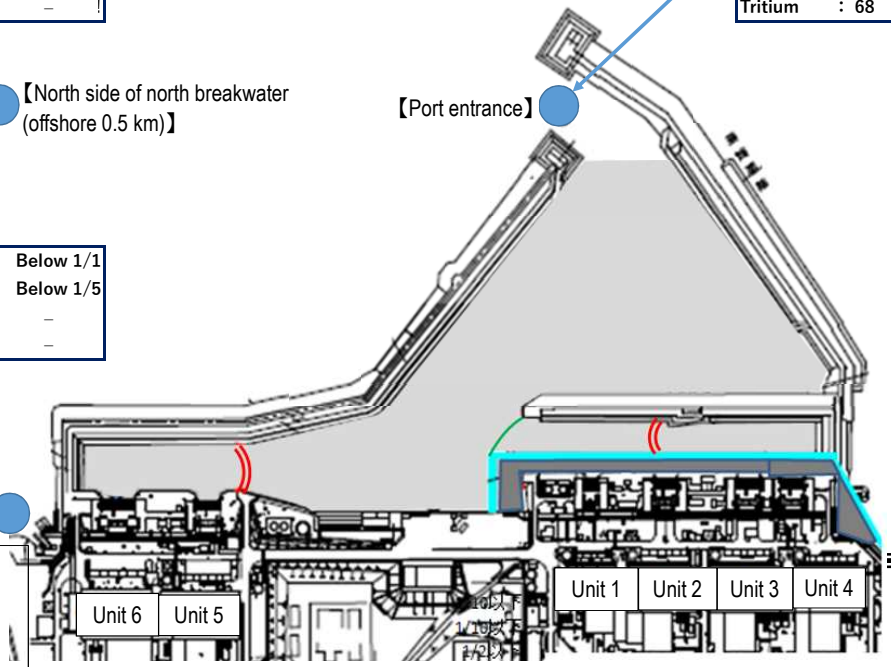
| | | | |
|---|---|---|---|
| Cesium-134 | ND (H25) → | _ | |
| Cesium-137 | ND (H25) → | _ | |
| Total β | ND (H25) → | _ | |
| Tritium | ND (H25) → | _ | |

| | | | |
|---|---|---|---|
| Cesium-134 | 1.8 (H25/6/21) → | ND(0.97) | Below 1/1 |
| Cesium-137 | 4.5 (H25/3/17) → | ND(0.82) | Below 1/5 |
| Total β | 12 (H25/12/23)→ | _ | _ |
| Tritium | 8.6 (H25/6/26) → | _ | _ |

| | | | |
|---|---|---|---|
| Cesium-134 | ND (H25) → | ND(0.68) | |
| Cesium-137 | 3 (H25/7/15) → | ND(0.93) | Below 1/3 |
| Total β | 15 (H25/12/23) → | 8.3 | |
| Tritium | 1.9 (H25/11/25) → | ND(0.35) | 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
March 27, 2025

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

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


1st Large Waste Storage Facility


Radioactive Waste Incinerator

10th Waste Storage Facility

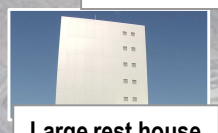

Volume Reduction Facility


Solid Waste Storage Facility

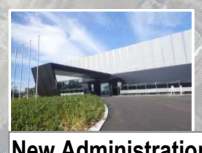

Temporary waste sludge storage


Spent adsorption vessel temporary storage facility


Access Control Building


Large rest house


Heliport


New Administration Office Building


Tank installation status

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

# 1 Contaminated water management

- Efforts to promote contaminated water management based on three basic policies:
  ① "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)


March 27, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

**Contaminated water management【Remove】**

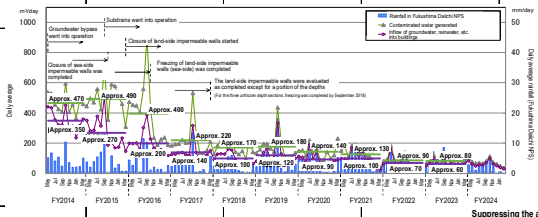
Contaminated water treatment facility
- ▽Reception start of contaminated water to Central Waste Treatment Building
- ▽Decontamination equipment (AREVA)
- ▽Evaporative concentration equipment
- ▽Cesium Adsorption Apparatus (KURION)
- ▽2nd Cesium Adsorption Apparatus (SARRY)
- Cesium Adsorption Apparatus (KURION)
- ▽Treatment of RO-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 System (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted)
- ▽Multi-nuclide Removal System (additional ALPS)
- ▽Start of full-scale operation (from 2017.10.16)
- ▽Multi-nuclide Removal System (high performance ALPS) (from 2014.10.18, hot tests conducted)
- ▽Inspection prior to use 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
- Unit 2
- ▽Completion of tunnel filling
- ▽Transfer of stagnant water complete
- ▽Completion of shaft filling
- 【Removal of contaminated water in seawater pipe trench】
- Unit 3
- ▽Completion of tunnel filling
- ▽Transfer of stagnant water complete
- ▽Completion of shaft filling (except for upper part of Shaft D)
- ▽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 ▽


Pumping well

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


Subdrain purification system

Land-side impermeable wall
- ▽Start of maintenance operation on north and south sides
- ▽Freezing completion
- ▽Start of maintenance operation in all sections
- In some temperature measurement tubes near the K drainage ▽ channel cross, temperature exceeded 0℃ locally
- ▽Installation start of land-side impermeable walls
- ▽Freezing start
- Start of maintenance operation on east side▽
- ▽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


Land-side impermeable wall brine (refrigerant) circulation pipe

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
- ▽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
- ▽Water leakage (300L) from flanged tank
- ▽Water leakage (100t) 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
- ▽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
- ▽Sprinkling start of rainwater within tank fences by rainwater treatment facility (from 2014.5.21)
- ▽Purification of strontium-reduced water in flanged tanks complete
- ▽Transfer and storage of all treated water in welded-joint tanks
- ▽Purification of strontium-reduced water com


Construction of welded-joint tanks


Flanged and welded-joint tanks

**Treatment of stagnant water**
- ▽Installation of stagnant water transfer equipment/transfer start
- ▽Completion of work to improve reliability of transfer line (replacement with PE pipes)
- ▽Start to maintain water-level difference with subdrain water level
- ▽Transfer start from each building to Central Rw Building
- ▽Floor exposure of Unit 1 T/B
- ▽Separation of stagnant water between Units 1 and 2
- ▽Floor exposure of Unit 1 RwB
- ▽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, RwB
- ▽Floor exposure of Unit 4 R/B, T/B, RwB
- ▽Treatment of stagnant water in buildings complete
- ▽Completed lowering to target water level of Unit 2 R/B
- ▽Completed lowering to target water level of Unit 1, 3 R/B
- ▽Reduction of stagnant water in the Reactor Buildings to approx. half of the level at the end of 2020 achieved

**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
- ▽Work for Units 1-4 RwB was completed
- ▽Measures to close openings were 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)

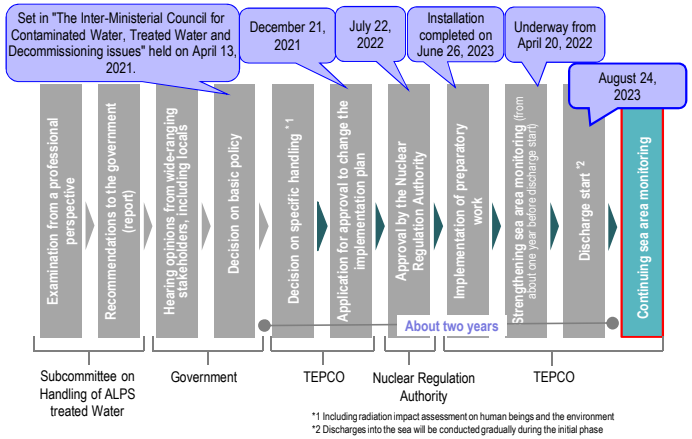

Chishima Trench Tsunami Seawall complete

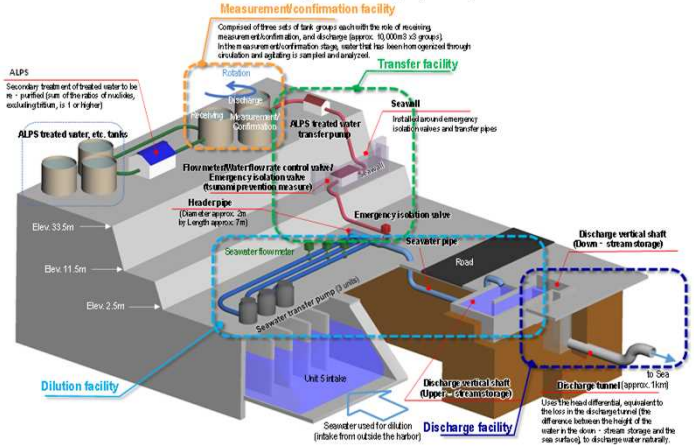
Japan Trench Tsunami Seawall

# 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 thoughts are taken seriously, and TEPCO conveys its efforts, thoughts, 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 | Tank Group C |
|---|---|---|---|
| Tritium concentration | 280,000 Bq/L | 310,000 Bq/L | 310,000 Bq/L |
| Discharge commencement | September 26, 2024 | October 17, 2024 | March 12, 2025 |
| Discharge termination | October 14, 2024 | November 4, 2024 | Discharge is underway |
| Discharge amount | 7,817 $m^3$ | 7,837 $m^3$ | |
| Total tritium amount | Approx. 2.2 trillion Bq | Approx. 2.4 trillion Bq | |

## ● Rearing test of marine organisms

- To alleviate concerns and lead to relief of local residents, related parties and the everyone in society, marine organisms are being reared in tanks of seawater containing ALPS treated water and the status is compared with that of 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)

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

2022.4.28, 5.13, 7.15 Application to partially revise the Application Documents for Approval to Amend the Implementation Plan was submitted

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)

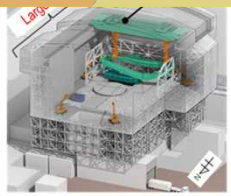

March 27, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

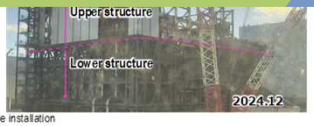
Legend: Rubble removal, etc. | Installing a fuel removal machine | Fuel removal | Storage and handling of fuel

## Unit 1

<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)




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.

Installation of the runway girder (2024.3.19)

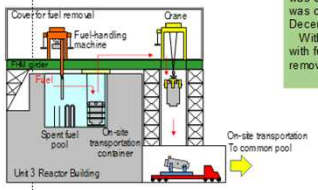
As part of efforts to remove fuel from the Unit 2 spent fuel pool and based on findings from internal operating floor investigations from November 2018 to February 2019, instead of fully dismantling the upper part of the building, the decision was made to install a small opening on the south side and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

▼2018.8-2020.12 Moving and containment of remaining objects
▼2020.6 Investigation inside the spent fuel pool
▼2021.6-2022.1 Decontamination of R/B operating floor (1)
▼2021.9-2022.5 Shielding installation in R/B operating floor (1)
▼2022.5-2022.6 Transfer of FHM
▼2022.7-2023.1 Removal and clean-up of FHM operation room
▼2022.12-2023.3 Removal of existing facilities in operating floor
▼2023.4-2023.11 Decontamination of R/B operating floor (2)
▼2023.11- Shielding of R/B operating floor (2)
▼2024.4 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
▼2025.3 Completion of installation of runway girder
▼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)

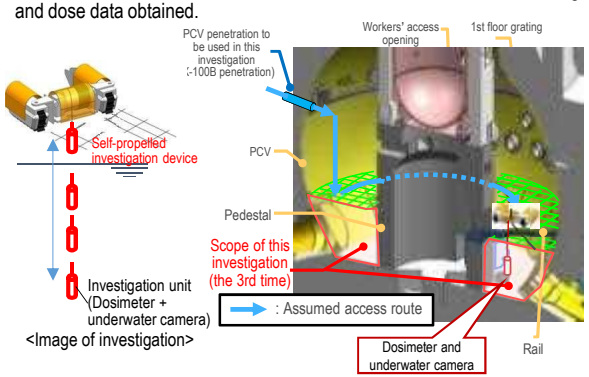
Commencement of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (From September 10, 2024, trial fuel debris retrieval commenced)

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

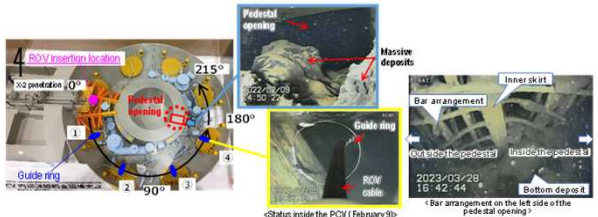
・In April 2015, a device having entered the inside of the PCV via a narrow opening (bore:φ100 mm) collected information such as images and airborne dose inside the PCV 1st floor.

・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<br>- Measuring the air temperature and dose rate<br>- Measuring the water level and temperature<br>- Sampling stagnant water<br>- Installing permanent monitoring instrumentation |
| | 2nd (2015.4) | Confirming the status of the PCV 1st floor<br>- Acquiring images<br>- Measuring the air temperature and dose rate<br>- Replacing permanent monitoring instrumentation |
| | 3rd (2017.3) | Confirming the status of the PCV 1st basement floor<br>- Acquiring images<br>- Measuring the dose rate<br>- Sampling deposit<br>- Replacing permanent monitoring instrumentation |
| | 4th (From 2022.2) | Acquiring information inside PCV (inside/outside of the pedestal)<br>- Acquiring images<br>- Measuring deposit thickness and sampling deposit<br>- Detecting deposit debris, 3D mapping |
| Leakage points from PCV | - PCV vent pipe vacuum break line bellows (identified in 2014.5)<br>- 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)

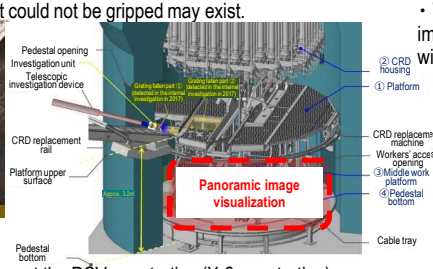
## **Unit 2** Investigation overview

・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)



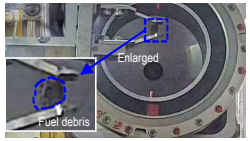

・In October 2020, a deposits contact investigation at the PCV penetration (X-6 penetration) was conducted. This confirmed that deposits inside the penetration had not deformed and come unstuck.

<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<br>- 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<br>- 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

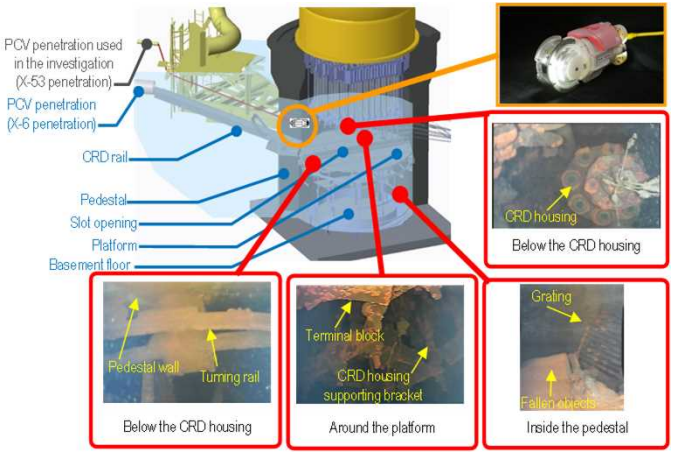
・In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, were investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.

・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>



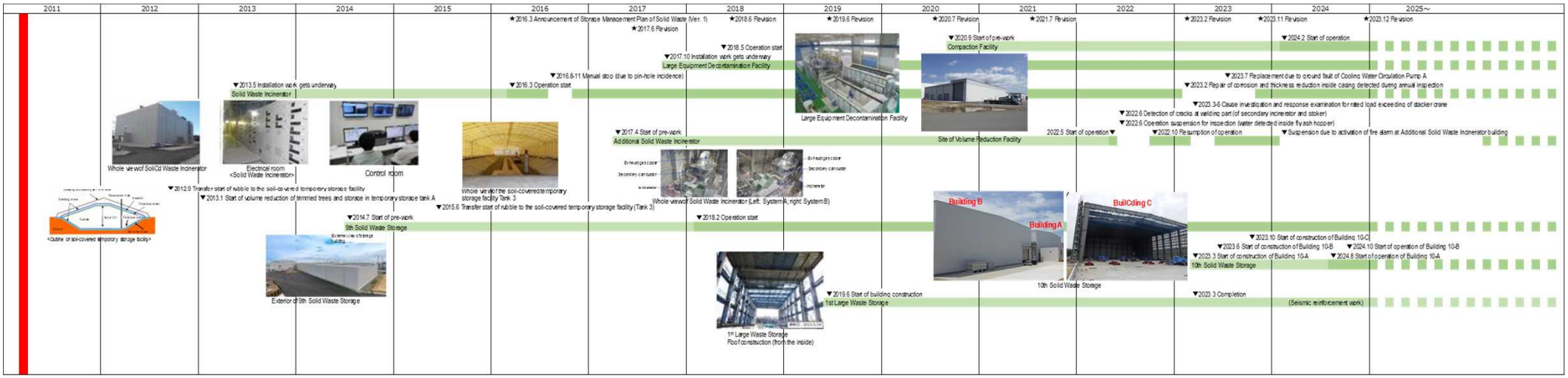

### Unit 3 PCV internal investigation

| | | |
|---|---|---|
| Investigations inside the PCV | 1st (2015.10-12) | - Acquiring images<br>- Measuring the air temperature and dose rate<br>- Measuring the water level and temperature<br>- Sampling stagnant water<br>- Installing permanent monitoring instrumentation (2015.12) |
| | 2nd (2017.7) | - Acquiring images<br>- Installing permanent monitoring instrumentation (2017.8) |
| Leakage points from PCV | - Main steam pipe bellows (identified in 2014.5) | |

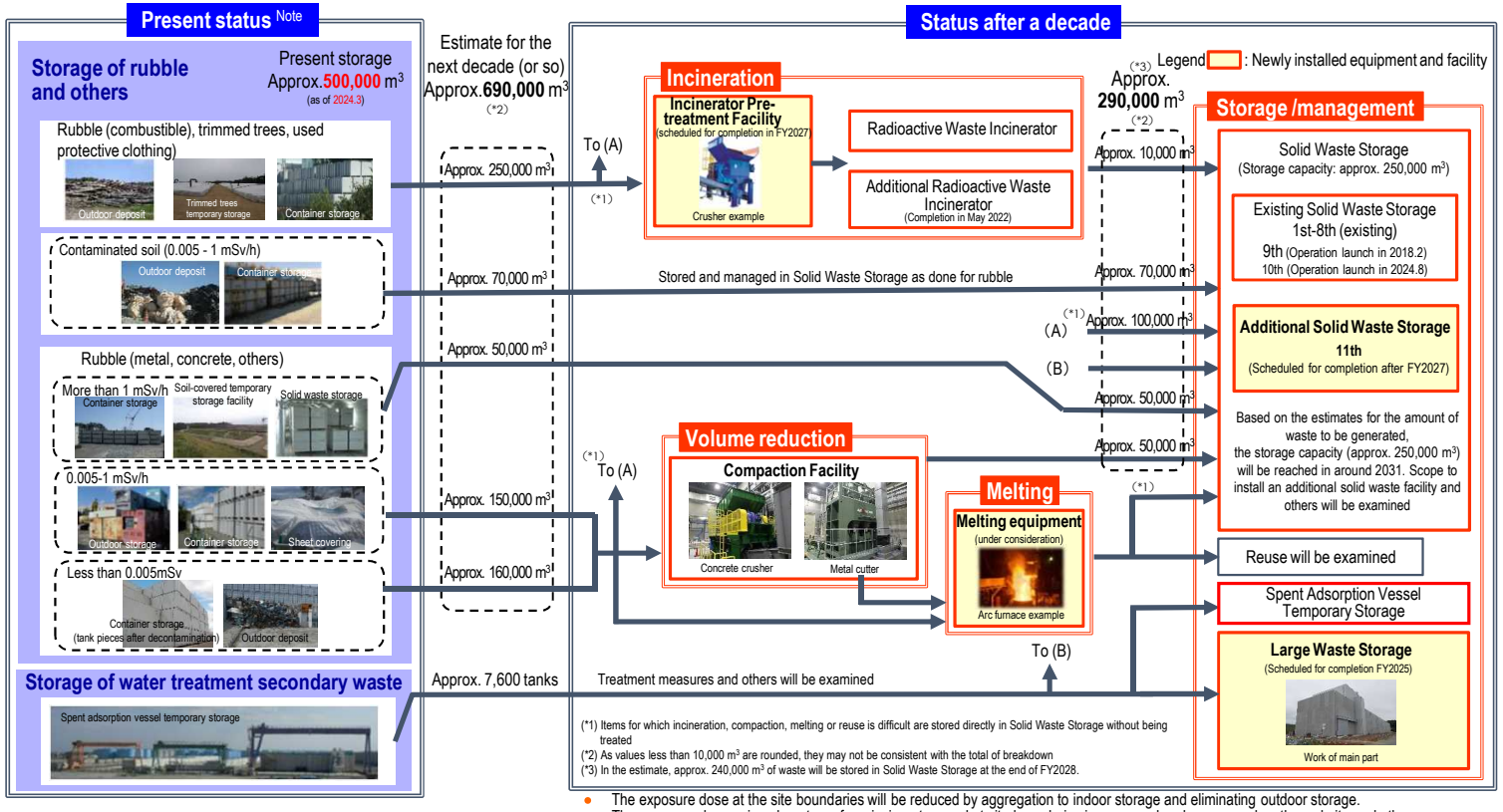
Evaluation of the location of fuel debris inside the reactor by measurement using muons
The evaluation confirmed that no large lump existed in the core area where fuel had been placed and that a portion of the fuel debris potentially existed at the bottom of the RPV. (2017.5-9)

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


March 27, 2025
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

▼ 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.

2012年

▼ 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

2013


Large rest house under construction (2014.9.30)

2014


Access Control Facility (2014.11.7)

2015

▼ 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.


Move in general working clothes (2016.1.7)

2016

2017


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.

2018

2019

▼ 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)

2020

2021


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

2022


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).

<FY2022 4th Quarter> (Measured in February 2023)


<FY2023 4th Quarter> (Measured in February 2024)


2023～

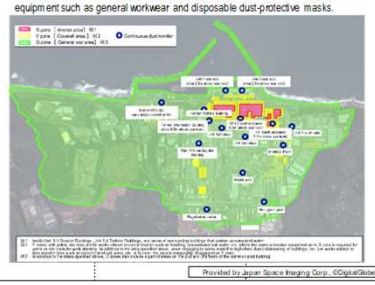
▼ In May 2013, areas excluding those around Unit 1-4, tank areas and rubble storage areas were set to full-face mask unnecessary areas.

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

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