Outline of Decommissioning, Contaminated Water and Treated Water Management

October 27, 2022
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 in December 2014 at Unit 4 and on February 28, 2021 at Unit 3.
Work continues sequentially toward the start of fuel removal from Units 1 and 2 and debris (Note 1) retrieval from Units 1-3.

(Note 1) Fuel assemblies having melted through in the accident.

<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

Fuel Removal from SFP: Units 1 and 2 — Rubble removal etc. → Installation of fuel removal equipment → Fuel removal; Units 3 and 4 — Storage / Transportation

First unit	Start of fuel debris retrieval
Unit 2	Within 2021 * Due to the spread of COVID-19, we have revised the plan to start from the second half of fiscal 2023 to improve safety and reliability.

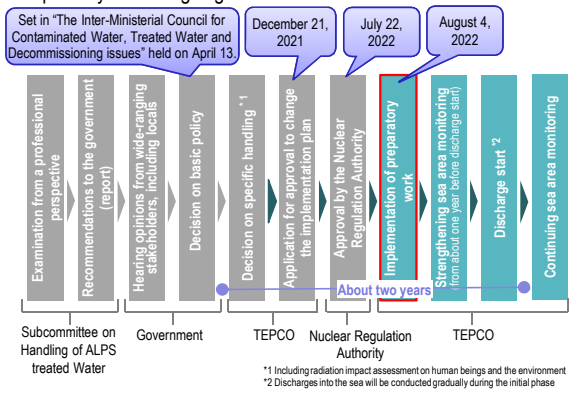
Fuel Debris Retrieval: Units 1 and 3 / Unit 2 — Understanding the situation inside the PCV / Consideration of retrieval methods, etc. → Fuel debris retrieval → Storage / Transportation

Dismantling Facilities: Scenario development & technology consideration → Design and manufacturing of devices / equipment → Dismantling

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, monitoring will be further enhanced and objectivity and transparency ensured by engaging with third-party experts and having safety checked by the IAEA. Moreover, accurate information will be disseminated with full transparency on an ongoing basis.



Contaminated water management - triple-pronged efforts -

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

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

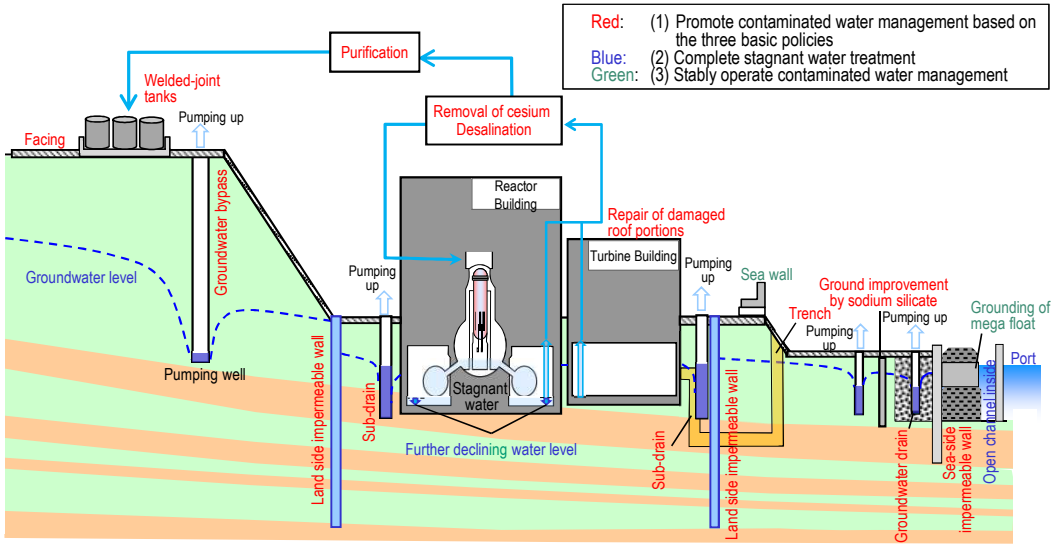
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal equipment) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and sub-drains, have stabilized 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, etc. Through these measures, the generation of contaminated water was reduced from approx. 540 m^3/day (in May 2014) to approx. 130 m^3/day (in FY2021).
- Measures continue to further suppress the generation of contaminated water to 100 m^3/day or less within 2025.

(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. At present, the floor surface exposure condition can be maintained except for the Unit 1-3 Reactor Buildings, Process Main Building and the High-Temperature Incinerator Building.
- In 2020, treatment of stagnant water in buildings was completed, except for the Unit 1-3 Reactor Buildings, Process Main Building and High-Temperature Incinerator Building. For Reactor Buildings, the amount of stagnant water there will be reduced to about half the amount at the end of 2020 during the period FY2022-2024.
- 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

- Various measures are underway to prepare for tsunamis. For heavy rain, sandbags are being installed to suppress direct inflow into buildings while work to close openings in buildings and install sea walls to enhance drainage channels and other measures is being implemented as planned.



Progress status

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

Organization to further reduce contaminated water generated

On October 18, the 25th Committee on Countermeasures for Contaminated Water Treatment (Chairperson: Dr. Yuzo Onishi) was held. Based on the assessment that "The effects of implementing multi-layered contaminated water management are clearly recognized. Despite fluctuation due to rainfall observed, contaminated water generated has been stably managed and accordingly efforts toward the target of suppressing contaminated water generated to 100 m^3/day or less within FY2025 have proceeded steadily," As well as proceeding with ongoing measures according to the plan, organization to further embody the direction toward further reducing the amount of contaminated water generated, such as measures for building local water stoppage, was discussed.

Regarding additional measures to further reduce contaminated water generated, organization will be conducted, including assessments of difficulty and expected effects, to implement them going forward.

Start of the rearing test of marine organisms

To actually and visually show that no adverse effects will be imposed on marine organisms, the practice of rearing flounder started from March 2022 using coastal seawater around the nuclear power station to learn how to rear marine organisms, verify the equipment design and others.

Preparation started from September 13 and the rearing test commenced from September 30.

Along with the test start, online publication of the rearing tanks using monitoring camera also started.

Cases reared in seawater with ALPS treated water added and in normal seawater are compared and the status is shown coherently and clearly.

<Rearing in seawater with ALPS treated water added>

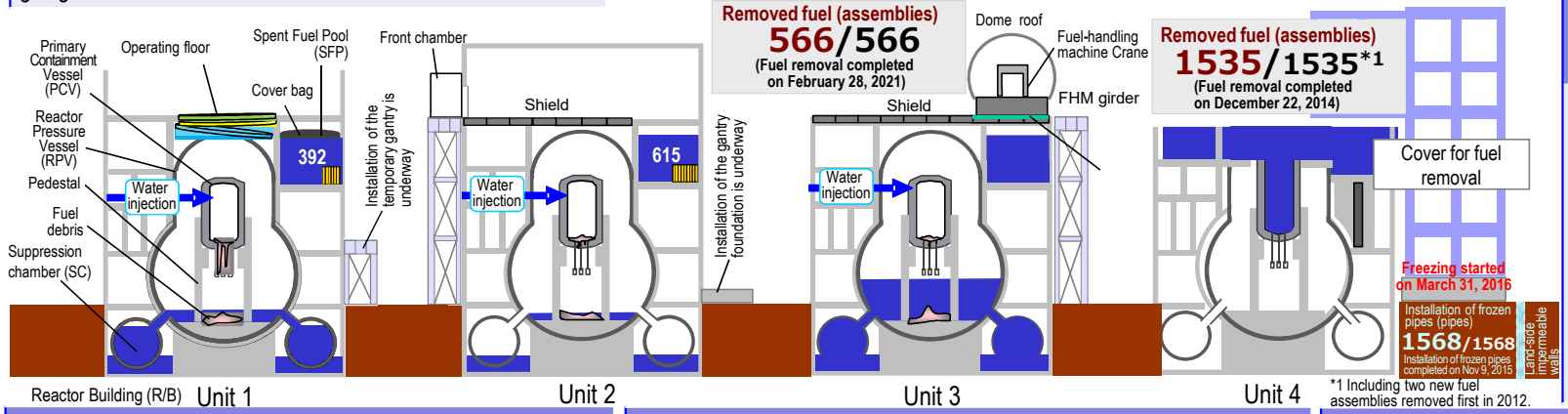
Marine organism rearing test live camera
https://www.youtube.com/channel/UCLEn8NHHX2WrMvn6ZYfAjJA

Status of sea area monitoring related to the handling of ALPS treated water

Regarding sea area monitoring related to the handling of ALPS treated water, based on the Sea Area Monitoring Plan published on March 24, 2022, sampling started from April 20.

The sea area monitoring results started to be published on a dedicated TEPCO HD website from September 29. The design will be modified to improve clearly still further.

Seawater monitoring portal site
https://www.tepco.co.jp/decommission/progress/watertreatment/monitoring/



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

Sampling of inclusive water in the Unit 1 suppression chamber

In order to reduce the water level of the Unit 1 Primary Containment Vessel to improve its seismic resistance, there is a plan to install an intake facility utilizing the existing pipe for the Reactor Water Clean-up System (CUW).

To examine the design of the intake facility, inclusive water in the suppression chamber will be sampled from the CUW pipe, which is a candidate for the intake inlet of the intake facility, from November 2022 to January 2023. Work will proceed with safety first.

The Sr-90 concentration in ALPS outlet water exceeded the legal discharge limit

In the additional ALPS (A) operated from July 27 to August 5, the concentration of Sr-90 in outlet water temporarily increased. There was no release into the environment.

The temporary increase in concentration was considered attributable to the altered pH environment inside the adsorption vessel in association with drain and water filling in all adsorption vessels during the latest periodical inspection.

Based on the assumed cause, the scope of drain and water filling in adsorption vessels during the periodical inspection will be appropriately reviewed. Moreover, after the periodical inspection, sampling of outlet water and others will be conducted to verify the influence of drain, water filling and others and subsequently prevent any recurrence.

Effects of the countermeasures on temperature increase in the temperature measuring tube 150-7S of the land-side impermeable walls continue

In August 2021, a temperature increase was detected in the temperature measuring tube 150-7S of the land-side impermeable walls (frozen walls). However, this increase affected no water stoppage function and the temperature had already declined to the level before increase.

The increase was considered mainly attributable to concentrated groundwater flow and also rain inflow, which was warmed by outside temperatures, including roof drainage from surrounding buildings.

After implementing the countermeasures, "trial water stoppage" and "destination change of rain drainage," the temperature declined since then no further increase like the one last year had recurred. Based on this result, it is considered that the effects of the countermeasures continue.

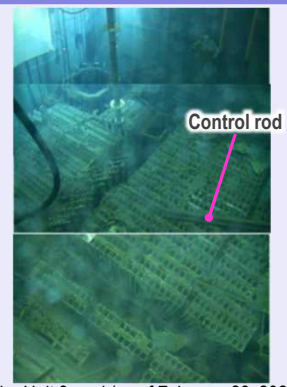
Moreover, in response to the suggested possibility of rain drainage from surrounding buildings affecting the land-side impermeable walls, countermeasures on buildings with a similar structure will also be taken.

Progress toward starting retrieval of high-dose equipment inside the Unit 3 spent fuel pool and others

There is a plan to transfer high-dose equipment such as control rods, which is stored in the Unit 3 spent fuel pool, to the existing site bankers and solid waste storage facilities to be stored.

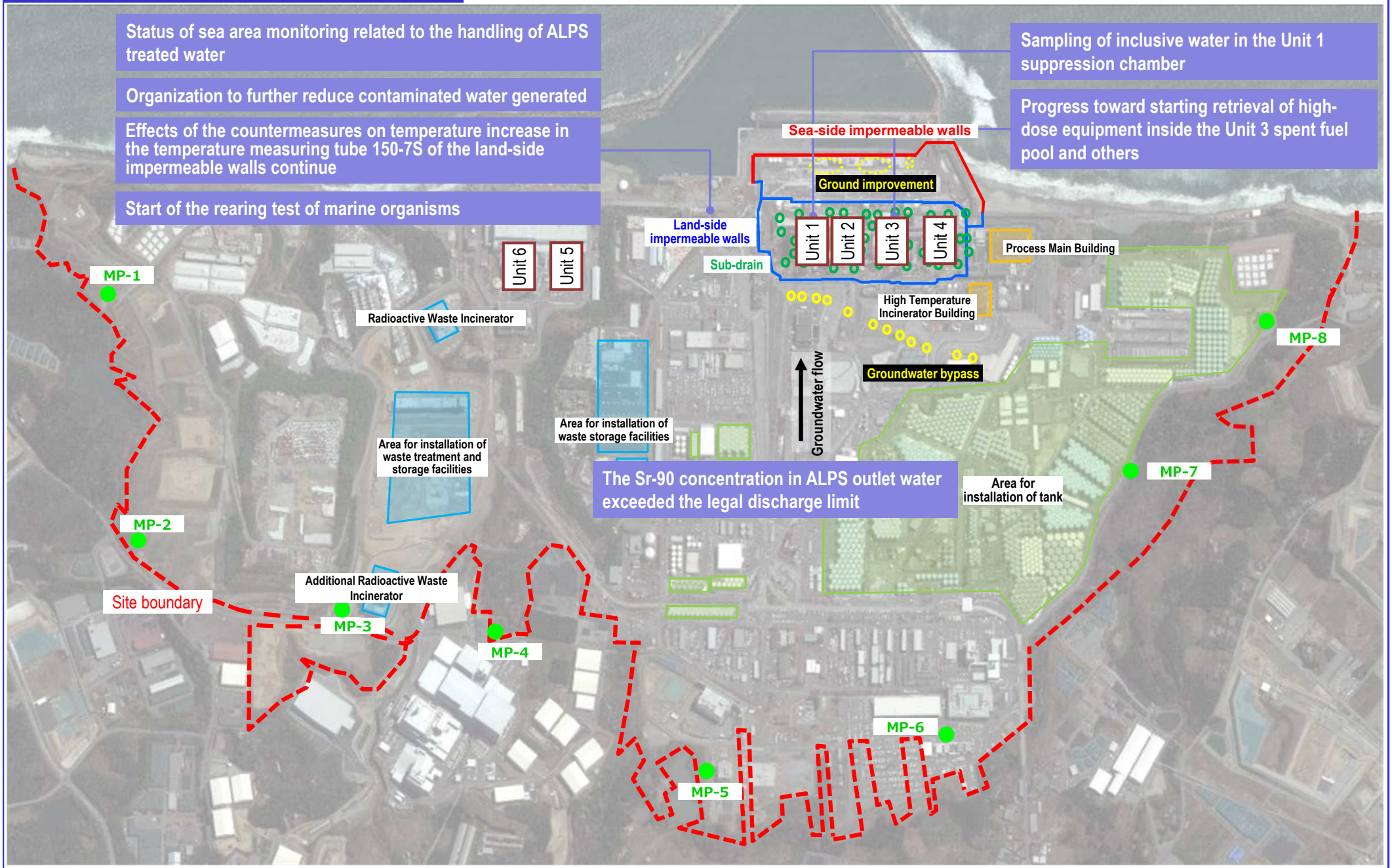
At present, related work is underway, including installation of the work platform which will support the transfer. Following its completion, a series of work will be verified using the actual transportation cask.

Once the preparation is completed, removal of high-dose equipment will commence from the 2nd half of 2022.



<Inside the Unit 3 pool (as of February 28, 2022>

Major initiatives – Locations on site

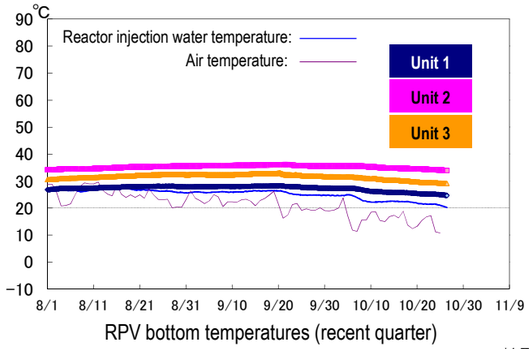


Provided by Japan Space Imaging Corp., photo taken on April 8, 2021
Product (C) [2020] DigitalGlobe, Inc., a Maxar company

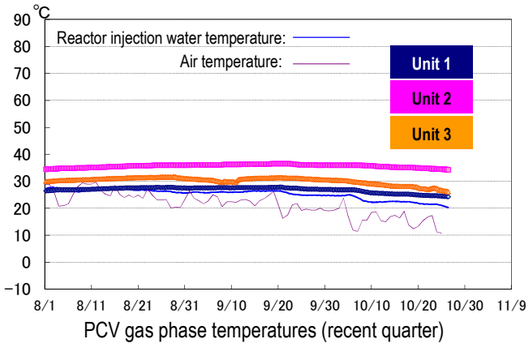
I. Confirmation of the reactor conditions

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 within the range of approx. 25 to 40°C for the past month, though it varied depending on the unit and location of the thermometer.

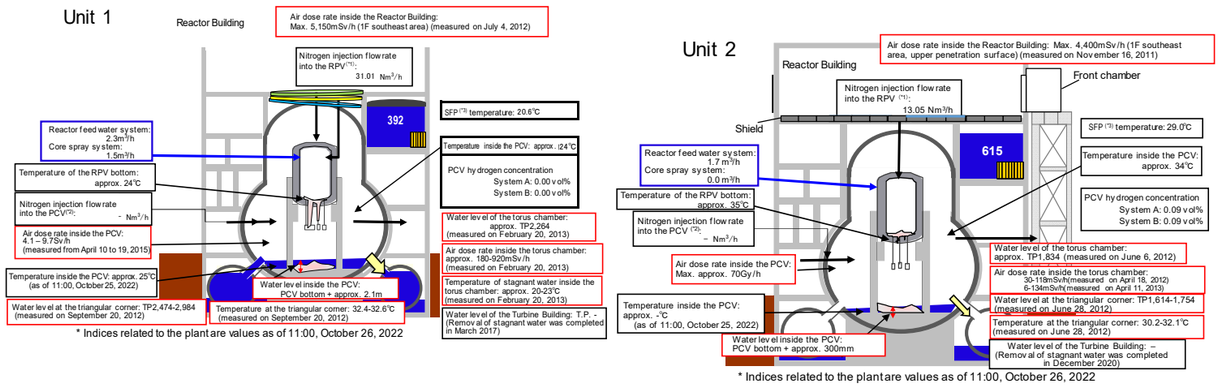


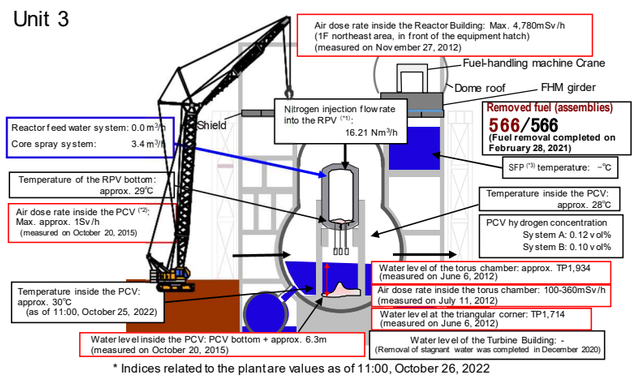
RPV bottom temperatures (recent quarter)



PCV gas phase temperatures (recent quarter)

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



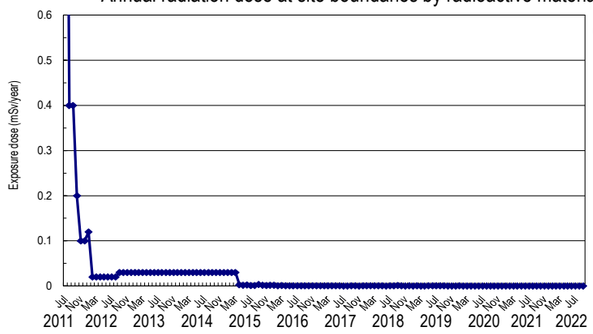


(*1) RPV (Reactor Pressure Vessel)
(*2) PCV (Primary Containment Vessel)
(*3) SFP (Spent Fuel Pool)

Release of radioactive materials from the Reactor Buildings

As of September 2022, 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. 2.1×10^{-12} Bq/cm^3 and 2.1×10^{-12} Bq/cm^3 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 x 10^{-5} Bq/cm^{3Marc}
  [Cs-137]: 3 x 10^{-5} Bq/cm^3
* Data of Monitoring Posts (MP1-MP8).
  Data of Monitoring Posts (MPs) measuring the air dose rate around the site boundary showed 0.324 – 1.061 μSv/h (September 28 -October 25, 2022).
  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.

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 condition or criticality sign detected.

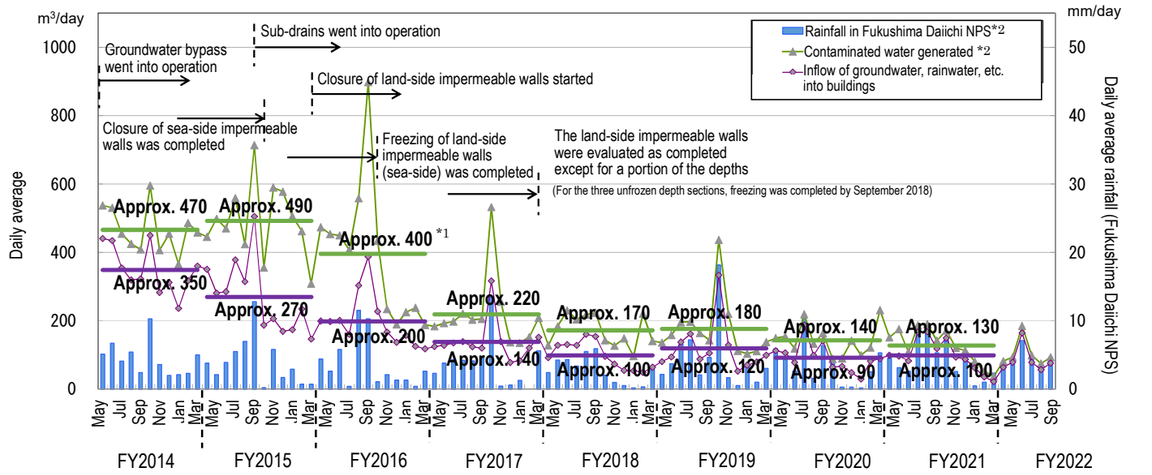
Based on the above, it was confirmed that the comprehensive cold shutdown condition had been maintained and the reactors remained in a stabilized condition.

II. Progress status by each plan

Measures for contaminated water and treated water

➢ Status of contaminated water generated

- Multi-layered measures, including pumping up by sub-drains and land-side impermeable walls, which were implemented to control the continued generation of contaminated water, suppressed the groundwater inflow into buildings.
- After implementing “redirecting” measures (groundwater bypass, sub-drains, land-side impermeable walls and others) and rainwater prevention measures, including repairing damaged portions of building roofs, the amount of contaminated water generated within FY2021 declined to approx. 130 m^3/day.
- Measures will continue to further reduce the amount of contaminated water generated.



*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 Sub-drain & Groundwater drains

- At the Water-Treatment Facility Special for Sub-drain & Groundwater drains, release started from September 14, 2015 and up until October 18, 2022, 2,007 release operations had been conducted.
  The water quality of all temporary storage tanks satisfied the operational target.

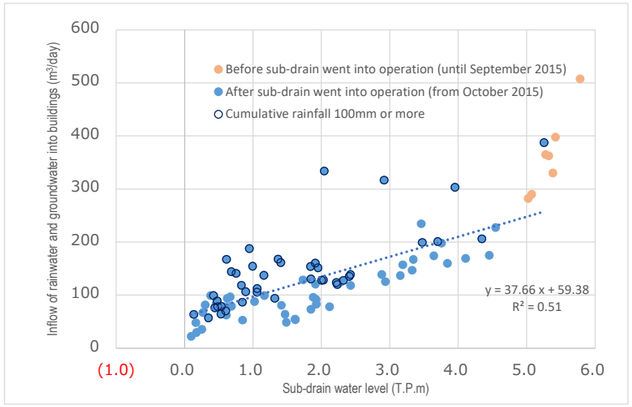


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 sub-drains

➢ Implementation status of facing

- Facing is a measure that involves asphalting the on-site surface to reduce the radiation dose, prevent rainwater infiltrating the ground and reduce the amount of underground water flowing into buildings. As of the end of September 2022, 95% 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 September 2022, 30% of the planned area (60,000 m^2) had been completed.

➢ Status of the groundwater level around buildings

- The groundwater level in the area inside the land-side impermeable walls has been declining every year due to the land-side impermeable walls and the decline in the set water level of the sub-drains. On the mountainside, the average difference between the inside and outside has remained at 4-5 m. The water level in the bank area has also remained low (T.P. 1.4 m) relative to the ground surface (T.P. 2.5 m).
- As the set water level of the sub-drains declined slightly (T.P. -0.55 ⇒ -0.65 m) and others in FY2021, the groundwater level on the sea side of the Unit 1-4 buildings remained low (except during heavy rainfall) compared with the T.P. 2.5 m area.

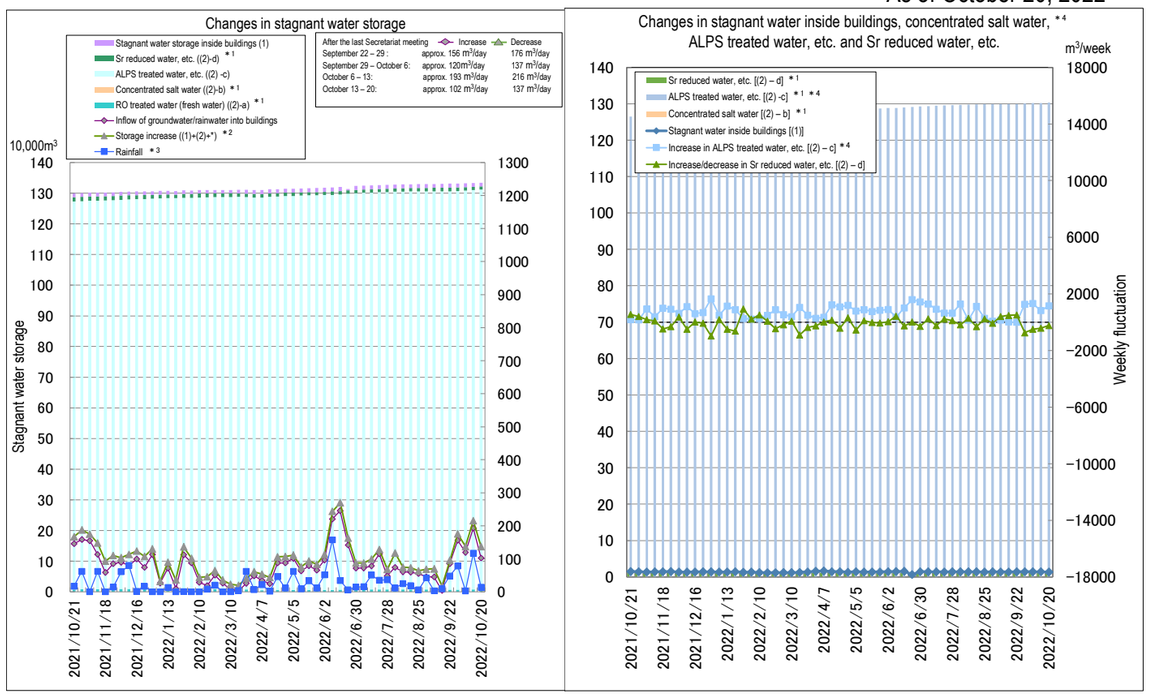
➢ Operation of the multi-nuclide removal equipment

- Regarding the multi-nuclide removal equipment (existing), hot tests using radioactive water are ongoing (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013). On March 23, 2022, a pre-service inspection certificate was granted by the Nuclear Regulation Authority and the entire pre-service inspection was completed. The (additional) multi-nuclide removal equipment went into full-scale operation from October 16, 2017. Regarding the (high-performance) multi-nuclide removal equipment, hot tests using radioactive water have been underway (from October 18, 2014).
- As of October 20, 2022, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 493,000, 741,000 and 103,000 m^3, respectively (including approx. 9,500 m^3 stored in the J1(D) tank, which contained water with highly concentrated radioactive materials at the System B outlet of the existing multi-nuclide removal equipment).
- 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 October 20, 2022, approx. 692,000 m^3 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 equipment is underway. Up until October 20, 2022, approx. 857,000 m^3 had been treated.

As of October 20, 2022



*1: Water amount for which the water-level gauge indicates 0% or more
*2: To detect storage increases more accurately, the calculation method was reviewed as follows from February 9, 2017: (The revised method was applied from March 1, 2018)
[(Inflow of groundwater/rainwater into buildings) + (other transfer) + (chemical injection into ALPS)]
*3: Changed from December 13, 2018 from rainfall in Namie to that within the site.
*4: The notation of treated water by the multi-nuclide removal equipment and others was reviewed in accordance with redefining of ALPS treated water by the Government (April 27, 2021)

Figure 3: Status of stagnant water storage

➢ Status of sea area monitoring related to the handling of ALPS treated water

The concentration of tritium in seawater within 2km of the port has remained constant for the past year and also remained low at new measurement points within the fluctuation range of seawater in Japan*. The concentration of Cesium-137 increased temporarily, which was considered due to rainfall as in the past fluctuation in seawater around the Fukushima Daiichi Nuclear Power Station. However, it remained constant relative to measurement benchmarks for the past year and at new measurement points and also low within the fluctuation range of seawater in Japan*. For tritium, monitoring has been conducted with a lower detection limit since April 18. Both concentrations of tritium and Cesium-137 in seawater within 20km of the coast had remained constant for the past year and low within the fluctuation range of seawater in Japan*.

- Both concentrations of tritium and Cesium-137 in seawater within 20km of the coast had remained constant for the past year and low within the fluctuation range of seawater in Japan*.
- The concentration of tritium in seawater further than 20km from the coast remained low, including at new measurement points, within the fluctuation range of seawater in Japan*. The concentration of Cesium-137 remained constant over the past year within the fluctuation range of seawater in Japan*.

* : The range of the minimum – maximum values detected during April 2019 – March 2021 in the database below
In Japan (including off the coast of Fukushima Prefecture):
Tritium concentration: 0.043 - 20 Bq/L
Cesium-137 concentration: 0.0010 - 0.45 Bq/L

Off the coast of Fukushima Prefecture
Tritium concentration: 0.043 – 2.2 Bq/L
Cesium-137 concentration: 0.0010 - 0.45 Bq/L
Source: Environmental Radioactivity and Radiation in Japan, Environmental Radiation Database
https://www.kankyo-hoshano.go.jp/data/database/

- For the status of fish and seaweed, no samples were collected in April. The concentration of tritium in fish sampled at the sampling point T-S8 had remained constant for the past year and low within the fluctuation range of seawater in Japan*. Regarding fish at other sampling points, measurement data is being verified.

* : The range of the minimum – maximum values detected during April 2019 – March 2021 in the database below
In Japan (including off the coast of Fukushima Prefecture)
Tritium concentration: 0.064 – 0.12 Bq/L

➢ Status of the examination regarding treatment of zeolite and other sandbags

- In the Process Main Building (PMB) and the High Temperature Incinerator Building (HTI), after laying zeolite and activated carbon sandbags (hereinafter referred to as zeolite and other sandbags) on the bottom floor, contaminated water in buildings was received and the current dose recorded is high.
- There are plans to split the work duties involved in collecting zeolite and other sandbags on the bottom floor of PMB and HTI into “accumulation” and “enclosing into containers” to streamline the process.
- Accumulation work will be improved through a life-size mockup, which is being conducted from October 2022, to commence the work within FY2023.
- Regarding work to enclose into containers, there are plans to submit an application to change the implementation plan around December 2022. As of now, the basic design has been completed and a detailed design is underway. Based on the review status of the implementation plan for similar work, the design is being re-examined appropriately. Depending on the re-examination status, the application time may be postponed but as the overall plan, arrangement of long-lead items is expected to be a critical process and the review period of the implementation plan change application, subcritical.

➢ Progress status of work to install the ALPS treated Water Dilution / Discharge Facility and related facilities

- For the measurement and confirmation / transfer facilities, work to install a pipe support, piping and others for these facilities started from August 4 from around K4 area tanks.
- For the discharge facility, the bedrock layer is being drilled by the shield machine from August 4 to start construction of the discharge tunnel.
- From August 4, as part of efforts to install the partition weir, preparatory work, including constructing a runway for heavy-duty machines, is being implemented. In the sea-side area for Units 5 and 6, removal of sedimentation inside the open intake channels will be conducted simultaneously and after installing the partition weir, anti-permeation work will be removed.

Fuel removal from the spent fuel pools

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

➢ Main work to help spent fuel removal at Unit 1

- From late April 2021, work to assemble a temporary gantry and others has been underway in a yard outside the site as part of efforts to install a large cover. The ground assembly was completed for the temporary gantry and lower structure and approx. 50%, for the upper structure.
- A work yard was prepared around the Reactor Building and preliminary work to install a large cover started from August 2021.
- From April 13, 2022, drilling to install an anchor in the Reactor Building started. A temporary gantry is also being installed from the portion where anchors and base plates are installed.
- The Isolation Condenser secondary side pipe (IC pipe)*, which hinders the installation of anchors and baseplates, was removed in late September.

* Isolation Condenser secondary-side pipe: The secondary-side pipe of the Isolation Condenser, which cools the inside of the Reactor Pressure Vessel when the external power source is lost and is currently unused.

➢ Main work to help spent fuel removal at Unit 2

- Decontamination to suppress dust scattering on the top floor of the Reactor Building was completed in December 2021 and contamination reduction was confirmed, based on smear sampling results before and after decontamination. Work to install shielding within a range including above the reactor well, where the highest level of dose was observed, was completed at the end of May. Due to interference with the installation of the new fuel-handling machine, work to remove the control room of the fuel-handling machine has been underway since August and will be completed at the end of November. Work progressed as planned with no significant increase in dust detected.
- Outside the building, ground improvement work before installing the gantry for fuel removal was completed in April 2022. To install the gantry foundation, excavation of the ground improvement construction roadbed (backfill soil) was completed in June. At present, installation of the concrete foundation is underway to be completed by early November.
- Regarding the gantry for Unit 2 fuel removal, from the perspective of reducing workers’ exposure during installation, steel frames will be assembled into large blocks (ground assembly), carried in to the Unit 2 south-side yard and erected. The 500-t crawler crane for the ground assembly of steel frames was assembled during the period August 6-9 and the ground assembly (carrying-in of the gantry steel frames) started from August 31. Ground assembly proceeds outside the site and assembled blocks will be carried in from late November to erect steel frames on site.

Retrieval of fuel debris

➢ Unit 1 PCV internal investigation (the latter half)

- The start of the investigation by ROV-D is expected to shift from the initially planned time at the end of November to early December because of the added mockup test to examine the expansion of the range for deposit 3D mapping by ROV-B.
- Examination is underway toward a latter half investigation. Images near the pedestal opening revealed that massive objects, previously considered deposits, existed on the opening wall akin to shelf deposits and the space under them would allow ROV-A2 to pass with ease. The feasibility of penetrating the inside of the pedestal thus increased.

➢ Progress status toward Unit 2 PCV internal investigation and trial retrieval

- Using the Naraha mockup facility, a mockup test simulating the actual site is underway.
- At present, after modifying the control program to position the arm more accurately, a permeability test using the X-6 penetration mockup continues. For improvements extracted in the performance verification test at Naraha, measures and improvement will continue to be implemented.
- Regarding work to install an isolation room as a boundary during opening of the X-6 penetration, a metal plate was installed as part of measures to prevent damage to the box-shaped rubber part housing the penetration flange handle. The isolation room was connected and pressure applied to verify the installation status. When foaming liquid was applied to the shielding door, bubble generation was detected. In response, the installation of the isolation room will be adjusted.
- Work continues safely and carefully.

➢ Recent results concerning grasping inner reactor conditions and properties of fuel debris

- To reduce the risks and inaccuracy of safety evaluation when examining fuel debris retrieval, based on insights and data acquired in the decommission site (internal investigations, accident analysis, mockup tests, TMI-2 insight), the figure of the estimated inner reactor conditions (damage status, debris distribution and dose distribution) and insights into the properties of fuel debris are updated.

- The accident progress scenario, with a focus on damage to the Reactor Pressure Vessel at the time of the accident, subsequent fuel debris migration and deposit was evaluated. Consequently, regarding Units 2 and 3, it could be estimated that fuel debris fell over several hours at a lower temperature than previously assumed and almost no Molten Core Concrete Interaction (MCCI) with concrete under the Primary Containment Vessel occurred.
- These insights are aggregated in debrisWiki (https://fdada-plus.info) and shared with related parties to be utilized in preparation for fuel debris retrieval.

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 the rubble and trimmed trees

- As of the end of September 2022, the total storage volume for concrete and metal rubble was approx. 330,100 m^3 (-400 m^3 compared to the end of August with an area-occupation rate of 88%). The total storage volume of trimmed trees was approx. 129,500 m^3 (slight increase, with an area-occupation rate of 74%). The total storage volume of used protective clothing was approx. 24,700 m^3 (-3,000 m^3, with an area-occupation rate of 47%). The decrease in rubble was attributable to transfer for area arrangement. As of the end of September 2022, there were ten temporary deposits with storage capacity exceeding 1,000m^3, storage 52,800m^3.

➢ Management status of secondary waste from water treatment

- As of October 6, 2022, the total storage volume of waste sludge was 499 m^3 (area-occupation rate: 71%), while that of concentrated waste fluid was 9,368 m^3 (area-occupation rate: 91%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal equipment and other vessels, was 5,432 (area-occupation rate: 86%).

➢ Progress status in optimizing the waste management

- In 2021, due to leakage of radioactive materials from containers and flooding from contaminated soil containers (notch tanks), temporary accumulation was increased and prolonged. In response, measures to optimize waste management are being implemented.
- To further reduce risks of “verification and correction of appropriate storage,” transfer of contaminated soil, which was scheduled in this fiscal year, was completed in June 2022 and transfer of corroded containers will be completed in December.
- As part of efforts to “maintain appropriate storage conditions,” adding temporary storage areas, eliminating temporary accumulation, management by new container maintenance methods and others will proceed.

➢ Resumption of operation of the additional Radioactive Waste Incinerator

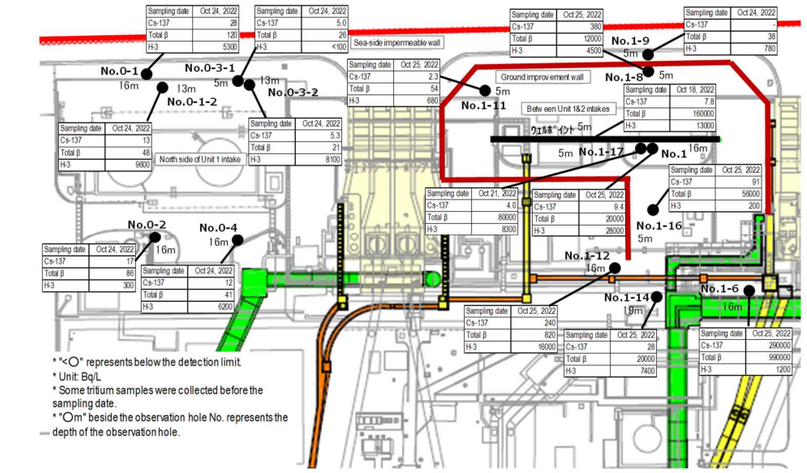
- Repair of malfunctions at cracked parts and bold connections, which were attributable to the earth on March 16 and detected in June, was completed and subsequently, equipment operation was verified until October 13 toward resuming the operation.
- Regarding the additional Radioactive Waste Incinerator, operation was resumed from October 17. When increasing the temperature, the soundness of the exhaust gas cooler spray was verified. After confirming no abnormality, operation was shifted to incineration.

Reduction in radiation dose and mitigation of contamination

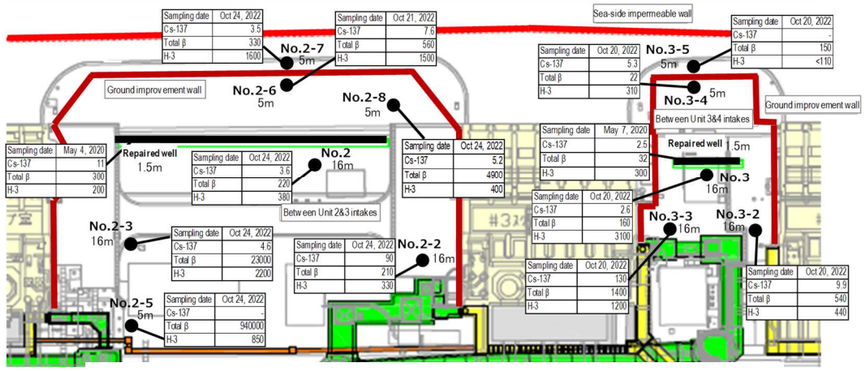
Effective dose-reduction at site boundaries and purification of port water to mitigate the impact of radiation on the external environment

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

- In the Unit 1 intake north side area, the H-3 concentration was below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or has been declining overall. The concentration of total β radioactive materials has remained constant overall but increased temporarily from April 2020 and is even increasing or declining at many observation holes at present, including Nos. 0-1-2, 0-3-1, 0-3-2 and 0-4. The trend continues to be monitored carefully.
- In the area between the Unit 1 and 2 intakes, the H-3 concentration has remained below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing or declining at Nos. 1-14 and 1-17 but has otherwise remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but been increasing or declining at many observation holes, including Nos. 1-6, 1-9, 1-11, 1-12, 1-14, 1-16 and 1-17. The trend continues to be monitored carefully.
- 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 been increasing and declining at Nos. 2-3, 2-5, 2-6 and 2-7 but has remained constant overall. The concentration of total β radioactive materials has remained constant overall but been increasing or declining at Nos. 2-3, 2-5 and 2-6. The trend continues to be monitored carefully.
- 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. It has remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but has been increasing or declining at many observation holes, including Nos. 3-4 and 3-5. The trend continues to be monitored carefully.
- In the groundwater on the east side of the Turbine Buildings, as with the total β radioactive materials, the concentration of cesium has also remained constant as the overall area but been increasing or declining and exceeded the previous highest record at some observation holes. Investigations into the fluctuation are underway for Nos. 0-3-2, 1, 1-6, 2-6 and 3-3.
- The concentration of radioactive materials in drainage channels has remained constant overall, despite increasing during rainfall.
- In the open channel area of 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 temporary increases in Cs-137 and Sr-90 noted 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 has 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 has been observed in FY2021 in the area outside the port (north and south outlets). Monitoring of the tendency continues, including the potential influence of the weather, marine meteorology and others.



<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

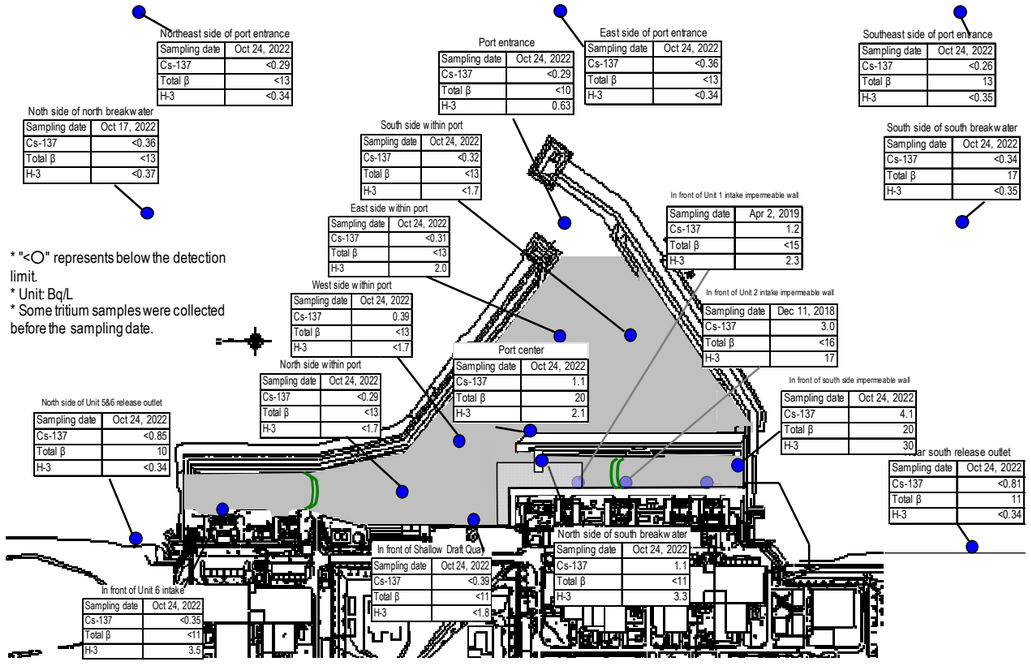


Figure 5: Seawater concentration around the port

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 June to August 2022 was approx. 9,300 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,100). 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 November 2022 (approx. 4,100 workers per day: cooperating company workers and TEPCO HD employees) would be secured at present. The average numbers of workers per day for each month (actual values) for the most recent 2 years were maintained, with approx. 3,000 to 4,200.
- The number of workers from within Fukushima Prefecture increased slightly and those outside, increased. The local employment ratio (cooperating company workers and TEPCO HD employees) as of September 2022 remained constant at around 70%.
- The average exposure doses of workers were approx. 2.54 and 2.60 and 2.51 mSv/person-year during FY2019, 2020 and 2021, respectively. (The legal exposure dose limits are 100 mSv/person and 50 mSv/person-year over five years, the TEPCO HD management target is 20 mSv/person-year).
- For most workers, the exposure dose was sufficiently within the limit and allowed them to continue engaging in radiation work.

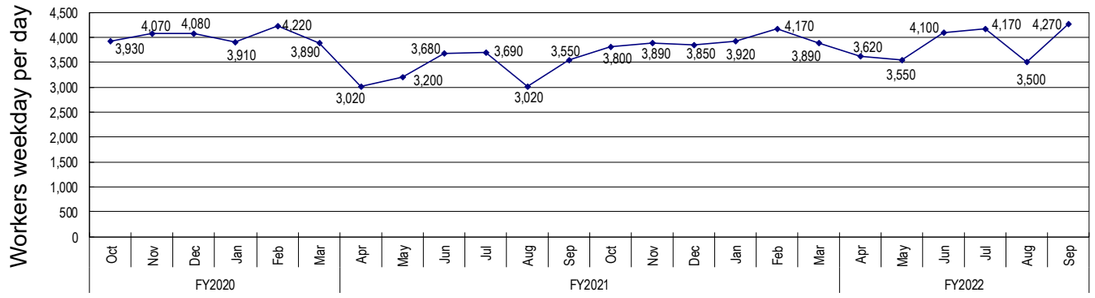


Figure 6: Changes in the average number of workers weekday per day for each month of the past 2 years (actual values)

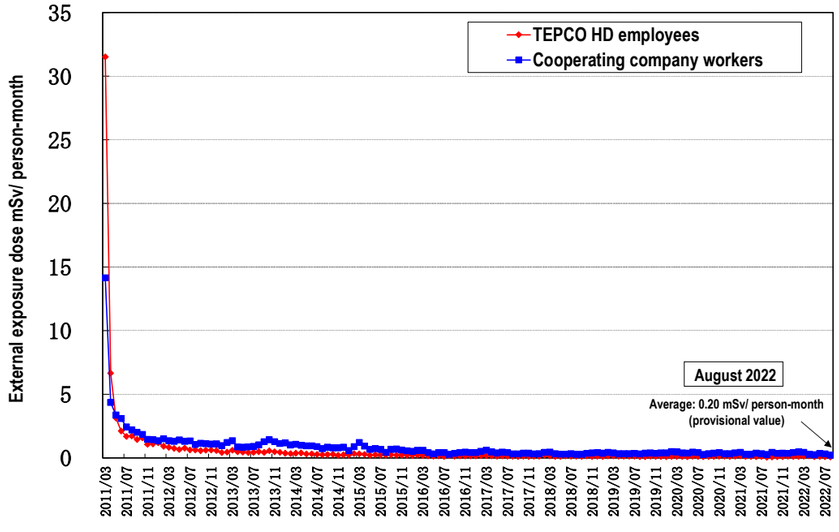


Figure 7: Changes in monthly average exposure dose of individual worker
(monthly exposure dose since March 2011)

➢ Countermeasures to suppress the spread of COVID-19 infections

- Since late-July, “not to bring” the virus into the nuclear power station, the following additional countermeasures have been implemented:
  - Employees must check their own physical condition and that of their family members. Those at risk of infection, such as those having moved outside Fukushima Prefecture and their family members having moved from outside, are required to detect infections at an early stage by voluntarily undergoing an antigen test.
  - When commuting, an ongoing occupancy rate of 50% continues to be recommended. Attention is drawn to the need to avoid smoking on board, wear masks, ensure ventilation, refrain from conversation and others.
- In August, infections have been increasing more than ever, mainly among cooperating company workers. Accordingly, the following countermeasures have been implemented to suppress the infection spreading:
  - Cooperating companies which recorded many infections were visited to inspect the status of the infection-suppressing countermeasures, such as ventilation within the office and reinstructed on strict implementation of these countermeasures (particularly when commuting and taking breaks).
  - Common areas within the site are simultaneously disinfected. Before coming to the company after the Obon holiday, employees had to strictly recheck their own physical condition and voluntarily undergo an antigen test.
- In early September, the implementation of the basic contents of the infection countermeasures was reaffirmed for cooperating company workers.
- From mid-September, infections have been decreasing. However, the ongoing basic countermeasures to prevent infection spreading, such as requiring employees to take their temperature before coming to the office, wear masks at all times, avoid the “Three Cs” by using the rest house in shifts, eat silently and carefully select business travel, will continue to be properly implemented to proceed with decommissioning work, prioritizing safety above all.
- As of October 26, 2022, 1,311 workers (including 170 TEPCO HD employees, 1,137 cooperating company workers, three business partner company employees and one temporary worker) of the Fukushima Daiichi Nuclear Power Station had contracted COVID-19, an increase of 127 workers (including nine TEPCO HD employees, 118 cooperating company workers) from the figures in the previous published material (as of September 28).
- No significant influence on decommissioning work, such as a corresponding delay to work processes due to this infection, had been identified.

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

- As health management measures in line with the guidelines of the Ministry of Health, Labour and Welfare (issued in August 2015), a scheme was established and operated, whereby prime contractors confirmed reexamination at medical institutions and the subsequent status of workers who were diagnosed as requiring “detailed examination and treatment” in the health checkup, with TEPCO confirming the operation status by the prime contractors.
- The recent report on the management status of the health checkup during the first quarter (April – June) in FY2022 confirmed that the prime contractors had provided appropriate guidance and managed operations properly under the scheme. The report on the follow-up status during the fourth quarter in FY2021 and before confirmed that responses to workers, which had not been completed by the time of the previous report, were being provided on an ongoing basis and checking of operations will continue.

➢ Status of heat stroke cases

- In FY2022, measures to further prevent heat stroke commenced from April to cope with the hottest season.
- FY2022, ten workers suffered heat stroke due to work up until October 24 (in FY2021, seven workers up until the end of October). Continued measures will be taken to prevent heat stroke.

Others

➢ Release of the Technical Strategic Plan 2022 for Decommissioning of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc.

- The Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) compiled and published the "Technical Strategic Plan 2022 for Decommissioning of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc." on October 11.
- This plan describes the “Status of efforts toward Unit 2 trial retrieval (internal investigation and fuel debris sampling)”, “Status of examination about methods for further expansion of the retrieval scale,” “Status of efforts to discharge ALPS treated water into the ocean” “Analytics strategy to proceed with decommissioning” and others.

➢ Transfer of inclusive water inside flanged tanks in the F1 tank area

- To terminate the operation of H, I and J area tanks (flanged tanks) in the F1 tank area (storing contaminated water from Units 5 and 6), purification of the inclusive water inside tanks commenced from July 2021. Treated water was sprinkled within the site and RO return water generated during purification was transferred to and stored in welded tanks.
- Transfer for the J area tanks was completed on July 8, 2022.
- For the remaining H and I area tanks, transfer commenced from October 20 and will be completed by the end of October.

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

"The highest value" → "the latest value (sampled during October 3-17)"; unit (Bq/L); ND represents a value below the detection limit

Summary of TEPCO data as of October 18, 2022

Note: The Total β measurement values include natural potassium 40 (approx. 12 Bq/L).
They also include the contribution of yttrium 90, which radioactively balance strontium 90.

Cesium-134	:	ND(0.34)		
Cesium-137	:	ND(0.37)		
Total β	:	ND(13)		
Toritium	:	ND(1.8)		※1

Cesium-134	: 3.3 (H25/12/24)	→	ND(0.26)	Below 1/10
Cesium-137	: 7.3 (H25/10/11)	→	ND(0.39)	Below 1/10
Total β	: 69 (H25/8/19)	→	ND(13)	Below 1/5
Toritium	: 68 (H25/8/19)	→	0.66	Below 1/100

Cesium-134	: 3.3 (H25/10/17)	→	ND(0.29)	Below 1/10
Cesium-137	: 9 (H25/10/17)	→	0.31	Below 1/20
Total β	: 74 (H25/8/19)	→	14	Below 1/5
Toritium	: 67 (H25/8/19)	→	ND(2.0)	Below 1/30

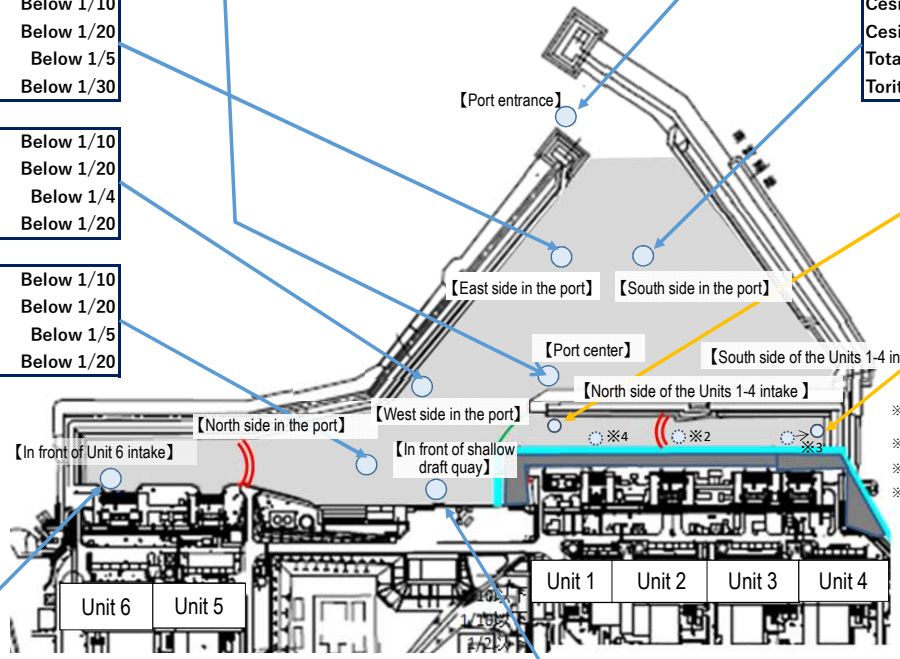
Cesium-134	: 3.5 (H25/10/17)	→	ND(0.25)	Below 1/10
Cesium-137	: 7.8 (H25/10/17)	→	ND(0.30)	Below 1/20
Total β	: 79 (H25/8/19)	→	ND(17)	Below 1/4
Toritium	: 60 (H25/8/19)	→	ND(2.0)	Below 1/30

Cesium-134	: 4.4 (H25/12/24)	→	ND(0.30)	Below 1/10
Cesium-137	: 10 (H25/12/24)	→	0.48	Below 1/20
Total β	: 60 (H25/7/4)	→	14	Below 1/4
Toritium	: 59 (H25/8/19)	→	ND(2.0)	Below 1/20

Cesium-134	: 32 (H25/10/11)	→	ND(0.31)	Below 1/100
Cesium-137	: 73 (H25/10/11)	→	0.86	Below 1/80
Total β	: 320 (H25/8/12)	→	19	Below 1/10
Toritium	: 510 (H25/9/2)	→	5.0	Below 1/100

Cesium-134	: 5 (H25/12/2)	→	ND(0.27)	Below 1/10
Cesium-137	: 8.4 (H25/12/2)	→	ND(0.34)	Below 1/20
Total β	: 69 (H25/8/19)	→	ND(12)	Below 1/5
Toritium	: 52 (H25/8/19)	→	ND(2.0)	Below 1/20

Cesium-134	ND(0.29)			
Cesium-137	4.3			
Total β	16			
Toritium	: 70			※1



Sea side impermeable wall
Silt fence
Silt fence for construction

Cesium-134	: 2.8 (H25/12/2)	→	ND(0.25)	Below 1/10
Cesium-137	: 5.8 (H25/12/2)	→	ND(0.35)	Below 1/10
Total β	: 46 (H25/8/19)	→	ND(15)	Below 1/3
Toritium	: 24 (H25/8/19)	→	ND(2.1)	Below 1/10

Cesium-134	: 5.3 (H25/8/5)	→	ND(0.20)	Below 1/20
Cesium-137	: 8.6 (H25/8/5)	→	0.44	Below 1/10
Total β	: 40 (H25/7/3)	→	ND(15)	Below 1/2
Toritium	: 340 (H25/6/26)	→	ND(1.8)	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.
※4: For the point, monitoring was finished from April 3, 2019 due to preparatory work for transfer of mega float.

	Legal discharge limit	WHO Guidelines for Drinking Water Quality
Cesium-134	60	10
Cesium-137	90	10
Strontium-90 (strongly correlate with Total β)	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 September 12-26)

Summary of TEPCO data as of October 18, 2022

	Legal discharge limit	WHO Guidelines for Drinking Water Quality
Cesium-134	60	10
Cesium-137	90	10
Strontium-90 (strongly correlate with Total β)	30	10
Tritium	60,000	10,000

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

Cesium-134	: ND (H25)	→	ND(0.23)	
Cesium-137	: ND (H25)	→	ND(0.28)	
Total β	: ND (H25)	→	13	
Toritium	: ND (H25)	→	_	

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

Cesium-134	: ND (H25)	→	ND(0.32)	
Cesium-137	: 1.6 (H25/10/18)	→	ND(0.32)	Below 1/2
Total β	: ND (H25)	→	17	
Toritium	: 6.4 (H25/10/18)	→	_	

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

Cesium-134	: ND (H25)	→	ND(0.24)	
Cesium-137	: ND (H25)	→	ND(0.27)	
Total β	: ND (H25)	→	17	
Toritium	: ND (H25)	→	_	

Cesium-134	: ND (H25)	→	ND(0.23)	
Cesium-137	: ND (H25)	→	ND(0.23)	
Total β	: ND (H25)	→	ND(12)	
Toritium	: 4.7 (H25/8/18)	→	_	

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

Cesium-134	: 3.3 (H25/12/24)	→	ND(0.26)	Below 1/10
Cesium-137	: 7.3 (H25/10/11)	→	ND(0.39)	Below 1/10
Total β	: 69 (H25/8/19)	→	ND(13)	Below 1/5
Toritium	: 68 (H25/8/19)	→	0.66	Below 1/100

【Port entrance】

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

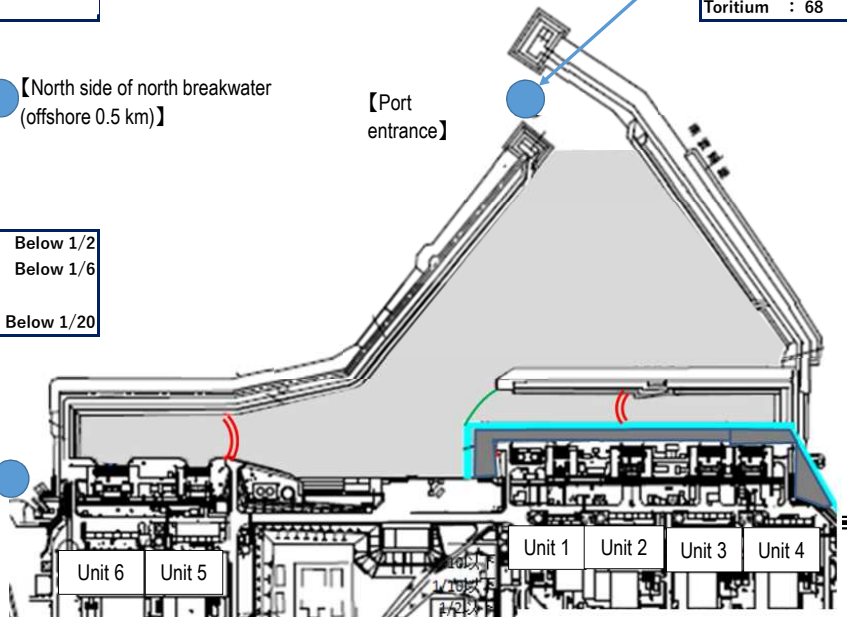
Cesium-134	: ND (H25)	→	ND(0.23)	
Cesium-137	: ND (H25)	→	ND(0.31)	
Total β	: ND (H25)	→	ND(11)	
Toritium	: ND (H25)	→	_	

Cesium-134	: 1.8 (H25/6/21)	→	ND(0.76)	Below 1/2
Cesium-137	: 4.5 (H25/3/17)	→	ND(0.75)	Below 1/6
Total β	: 12 (H25/12/23)	→	9.6	
Toritium	: 8.6 (H25/6/26)	→	ND(0.32)	Below 1/20

Cesium-134	: ND (H25)	→	ND(0.68)	
Cesium-137	: 3 (H25/7/15)	→	ND(0.85)	Below 1/3
Total β	: 15 (H25/12/23)	→	11	
Toritium	: 1.9 (H25/11/25)	→	ND(0.32)	Below 1/2

【North side of Unit 5 and 6 release outlet】

【Near south release outlet】



Sea side impermeable wall

Silt fence

Silt fence for construction

Note: The Total β measurement values include natural potassium 40 (approx. 12 Bq/L).
They also include the contribution of yttrium 90, which radioactively balance strontium 90.

Note: Because safety of the sampling points was unassured due to the influence of Typhoon No. 10 in 2016, samples were taken from approx. 330 m south of the Unit 1-4 release outlet.
Samples were also taken from a point approx. 280m south from the same release outlet from January 27, 2017 and approx. 320m from March 23, 2018.

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

October 27, 2022

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

Trimmed trees (outdoor accumulation)

Temporary trimmed trees storage pool

Temporary soil-covered type storage facility

Rubble (outdoor accumulation)

Rubble storage tent

Inside the rubble storage tent

Rubble (covered by sheet)

Solid waste storage facility

Rubble (container storage)

Tank installation status

Spent adsorption vessel temporary storage facility

Temporary waste sludge storage

Provided by Japan Space Imaging Corporation, photo taken on April 8, 2021
Product(C) [2020] DigitalGlobe, Inc., a Maxar company

0m 100m 500m 1000m

1 Contaminated water management

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

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

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

Contaminated water management [Remove]

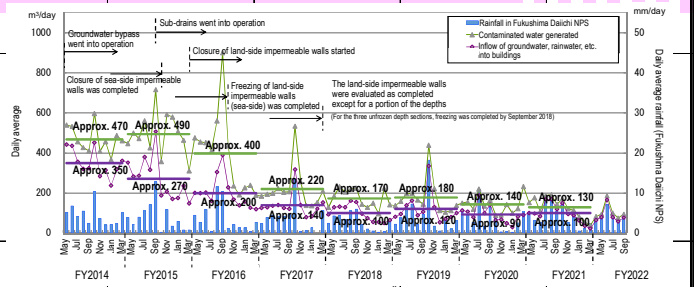
Contaminated water treatment facility
- ▽Reception start of contaminated water to Central Waste Treatment Building
- ▽Decontamination equipment (AREVA)
- ▽Evaporative concentration equipment
- ▽Cesium Adsorption Apparatus (KURION)
- ▽2nd Cesium Adsorption Apparatus (SARRY)
- ▽Treatment of RO-condensed salt water complete
- ▽Reduction of strontium by Cesium Adsorption Apparatus (KURION) (from 2015.1.6)
- ▽Reduction of strontium by 2nd Cesium Adsorption Apparatus (SARRY) (from 2014.12.26)
- ▽Purification of strontium-reduced water in flanged tanks complete
- ▽Purification of strontium-reduced water complete
- ▽Reduction of strontium by 3rd Cesium Adsorption Apparatus (SARRY II) (from 2019.7.12)
- ▽Treatment start of strontium-reduced water (ALPS: from 2015.12.4, additional: from 2015.5.27, high-performance: from 2015.4.15)
- ▽Multi-nuclide Removal Equipment (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted)
- ▽Multi-nuclide Removal Equipment (additional ALPS)
- ▽Start of full-scale operation (from 2017.10.16)
- ▽Multi-nuclide Removal Equipment (high performance ALPS) (from 2014.10.18, hot tests conducted)


Cesium Adsorption Apparatus (KURION)


Multi-nuclide removal equipment (ALPS)

Removal of contaminated water from seawater pipe trench
- Unit 2
- ▽Completion of tunnel filling
- ▽Transfer of stagnant water complete
- ▽Completion of shaft filling
- Unit 3
- ▽Completion of tunnel filling
- ▽Transfer of stagnant water complete
- ▽Completion of shaft filling (except for upper part of S
- Unit 4
- ▽Completion of tunnel filling
- ▽Filling of openings II and III complete
- ▽Transfer stagnant water complete
- ▽Completion of filling parts running over
- 【Removal of contaminated water in seawater pipe trench】


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)


Pumping well

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


Sub-drain 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 ▽
- Although no influence was detected on the impermeable function of the land-side impermeable walls but test investigation is underway for the stoppage effect
- ▽Installation start of land-side impermeable walls
- ▽Freezing start
- Start of maintenance operation on north▽
- ▽Freezing completion (except for some parts)


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


Placement of seaside impermeable walls complete

Storage facility
- ▽RO濃縮塩水の浄化処理完了
- ▽鋼製角形タンクのリプレース完了
- ▽Storage in steel square tanks
- ▽Removal of steel horizontal tanks complete (except for condensed waste liquid storage tank)
- ▽Water leakage (300L) from flanged tank
- ▽Water leakage (100l) from flanged tank
- ▽Storage in flanged cylindrical tanks
- ▽Completion of fence to prevent leakage expanding
- ▽Water leakage (10L) from flanged tank
- ▽Work to raise fence height complete
- ▽Purification of strontium-reduced water in flanged tanks complete
- ▽Transfer and storage of all treated water in welded-joint tanks
- ▽Leakage of contaminated water from underground reservoir => Start of transfer to tanks
- ▽Transfer of contaminated water to tanks complete
- ▽Storage in cylindrical steel welded-joint tanks
- ▽Purification of strontium-reduced water complete
- ▽Sprinkling start of rainwater within tank fences by rainwater treatment facility (from 2014.5.21)


Construction of welded-joint tanks


Flanged and welded-joint tanks

Treatment of stagnant water
- ▽Start to maintain water-level difference with sub-drain water level
- ▽Transfer start from each building to Central Rw Building
- ▽Treatment of stagnant water in buildings complete
- ▽Installation of stagnant water transfer equipment/transfer start
- ▽Completion of work to improve reliability of transfer line (replacement with PE pipes)
- ▽Floor exposure of Unit 1 T/B
- ▽Separation of stagnant water between Units 1 and 2
- ▽Floor exposure of Unit 1 Rw/B
- ▽Separation of stagnant water between Units 3 and 4
- ▽Floor exposure of Unit 2 T/B, Rw/B
- ▽Floor exposure of Unit 3 T/B, Rw/B
- ▽Floor exposure of Unit 4 R/B, T/B, Rw/B

Countermeasures to tsunami risks

Closure of openings
- ▽Examination start of measures to close building openings
- ▽Work for common pool complete
- ▽Work for Units 1 and 2 T/B complete
- ▽Work for HTI building complete
- ▽Work for Process Main Building complete
- ▽Work for Unit 3 T/B complete
- ▽Work for Unit 1-3 R/B complete
- ▽Measures to close openings were completed
- ▽Work for Units 1-4 RwB was completed

Seawall
- ▽Installation of outer-rise tsunami seawall complete
- ▽Construction start of Tsushima Trench Tsunami Seawall
- Japan Trench tsunami seawall
- ▽Completion of installation ▽On-site start


Chishima Trench Tsunami Seawall complete

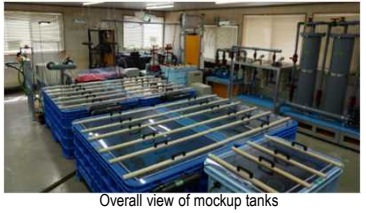

Construction of Japan Trench Tsunami Seawall

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

2 Handling of ALPS treated water

In “The Inter-Ministerial Council for Contaminated Water, Treated water and Decommissioning” held on April 13, 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.


Overall view of mockup tanks


Flounder in rearing preparation tank

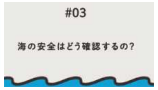
Enhancement of communication activities

- Measures for decommissioning, contaminated water and treated water of the Fukushima Daiichi Nuclear Power Station need efforts to reduce risks over a long term. Regarding handling of ALPS treated water as a part of decommissioning, to local residents, those who in the fishery industry and related parties, we will thoroughly explain about the policies and responses concerning the facility design, operation and management to ensure safety, monitoring of radioactive materials and others, and proceed with **efforts to sincerely face their concerns and interests and respond to each of them**.
- Moreover, to **further deepen the understanding** of everyone in Japan and overseas, efforts to **coherently disseminate** measurement results of ALPS treated water and information concerning facility operation, radiation impact assessment and others will continue and be enhanced.

● Information dissemination via media in Japan and overseas and others
- To help deliver information based on scientific evidence, press release, press conference, disclosure of power plant site, briefing and others are held.
- For overseas major media, diplomatic corps and others, briefing and press tour are held. Information dissemination to neighboring countries is also being enhanced. Information dissemination to overseas media and information provision to embassies is focused.
  Ex.) May 10, 2022 Diplomatic corps and others, overseas media and others


Press conference

Completely revised in January 2022



“Understand by video. ALPS Treated Water” series
Now available on youtube (Japanese and English)

● Safety review of International Atomic Energy IAgency (IAEA)
- In February 2022, IAEA officials and international professionals (US/ UK/ France/ Russia/ China/ others) visited Japan to conduct technical inspection based on the international safety standard and on April 29, the report of safety assessment was published.
- The report states that in regards to the safety of the facility, the IAEA has found that, “TEPCO successfully incorporated prevention measures in the design of the facility as well as in the associated operating procedures.” In regards to the Radiological Environmental Impact Assessment, “it acknowledged that the doses to the assumed representative person are expected to be very low and significantly below the dose constraint set by the Japanese regulatory body.”


IAEA onsite investigation

● Communication with related parties taking various opportunities
- Efforts to explain about policies and safety measures for handling of ALPS treated water, countermeasures to rumors and others to people in the Metropolitan area, local residents and related parties and hear their opinions proceed. (In FY2021, approx. 3,000 times)
- Visits and Discussion Meetings of the Fukushima Daiichi Nuclear Power Station have been held since FY2019 for 13 municipalities in Hamadori. In FY2021 and FY2022, the Visits and Discussion Meetings were expanded to within Fukushima Prefecture. (In FY2022, a total of 17 times are scheduled)
- Moreover, online visits (connecting visitors and guide online) utilizing the “Fukushima Daiichi Virtual Tour” video, which is now being published on the TEPCO web site, and others are also offered in response to the need of people in Japan and overseas.
  (From August 2020 to July 2022 Online visitors: 59 organizations, 2,250 persons including overseas organizations)


Discussion meeting (face-to-face dialogue)

● Rearing test of marine organisms
- To alleviate concerns and lead to relief of local residents, related parties and the everyone in society, marine orgasms are being reared in tanks of seawater containing ALPS treated water and the status is compared with the original seawater controls. The progress will be shown coherently and clearly.
- Regarding behaviors of tritium and others, a lot of research has been conducted in Japan and overseas. Based on the experimental results, firstly experimental data for a half year will be collected and subsequently, the same as past experimental results, the theory “tritium in vivo is not concentrated and the concentration of tritium in vivo will not exceed the level in the growing environment” will also be reaffirmed.
- Froom March 2022, practice to rear flounder started using coastal seawater around the nuclear power station to learn how to rear marine organisms, verify the equipment design and others.
- From September 30, the stage was shifted to the next “rearing test” and on October 3, ALPS treated water was added.

- From March 17, daily rearing status is published on the TEPCO HD homepage and twitter.
  - Homepage address: http://www.tepco.co.jp/decommission/information/newsrelease/breedingtest/index-j.html
  - Twitter address: https://twitter.com/TEPCOfishkeeper

Examination concerning handling of ALPS treated water

Tritiated Water Taskforce (2013.12 – 2016.5, 15 meetings)

2016.6 Report of Tritiated Water Taskforce


Tank area viewed from the Large Rest House (2015.10.29)

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)

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

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

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

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

2022.8.4 Work has commenced

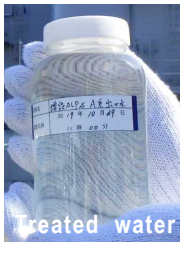
2021.4.13 The basic policy on the handling of ALPS treated water was set

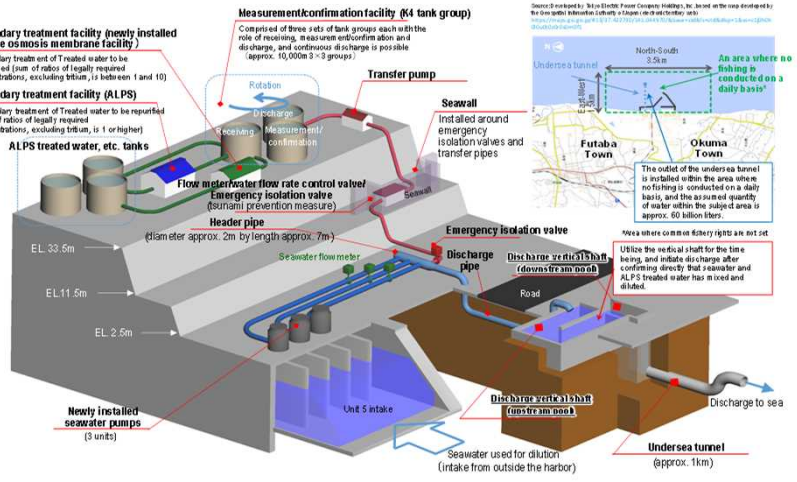
2021.4.16 The response of TEPCO was announced

2022/8/30 The "Approach to Strengthening and Expansion of Measures in the Handling of ALPS Treated Water" was summarized

2014 2015 2016 2017 2018 2019 2020 2021 2022

【Overview of ALPS treated water dilution and discharge facility】





3 Removal of fuel from spent pool

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

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

October 27, 2022
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

▼ 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

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


<Unit 4 Cover for fuel removal>

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


Fuel removal

▼ 2014.12.22 Fuel removal was completed (1533 assemblies)

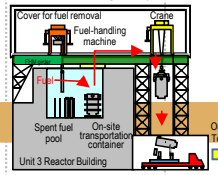
Unit 4

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

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

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

Overview of the fuel-handling facility inside the cover



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

▼ 2021.2.28 Fuel removal completed (566 assemblies)

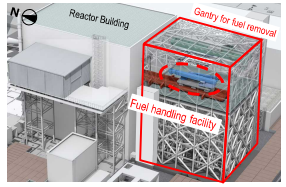
Unit 3

▼ 2015.3-2016.11 Yard construction


<Unit 2 Construction of gantry for fuel removal>

▼ 2016.9-2017.4 West-side gantry installation work
▼ 2017.5 Opening a hole in the west-side external wall
▼ 2018.8-2020.12 Moving and containment of remaining objects
▼ 2020.6 Investigation inside the spent fuel pool
▼ 2021.10-2022.4 Ground improvement work

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



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.

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.

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

Unit 2

▼ 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
▼ 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
▼ 2021.8 Start of large cover pre-work

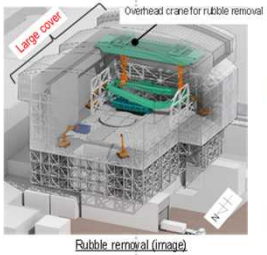
For Unit 1, a large cover will be installed over the whole building, within which rubble will be removed.

As part of efforts to remove fuel from the Unit 1 spent fuel pool, investigations are underway to ascertain the conditions of the fallen roof on the south side and the contamination of the well plug. Based on the results, “the method initially installing a large cover over the Reactor Building, then removing rubble within the cover” was selected to ensure safer and more secure removal. Work to install a large cover started from August 2021. Work to complete the installation of a large cover by around FY2023 is ongoing, with fuel removal scheduled to run from FY2027 to FY2028.

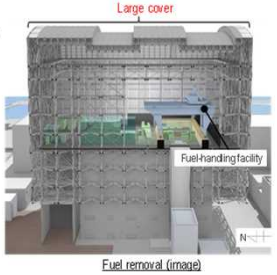
<Reference> Progress to date
Rubble removal on the north side of the operating floor started from January 2018 and has been implemented sequentially. In July and August 2019, the well plug, which was misaligned, was investigated, followed in August and September by the conditions of the overhead crane.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

Unit 1


<Unit 1 Dismantling of remaining cover>



Rubble removal (image)



Fuel removal (image)

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

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

4 Work toward fuel debris retrieval

October 27, 2022
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

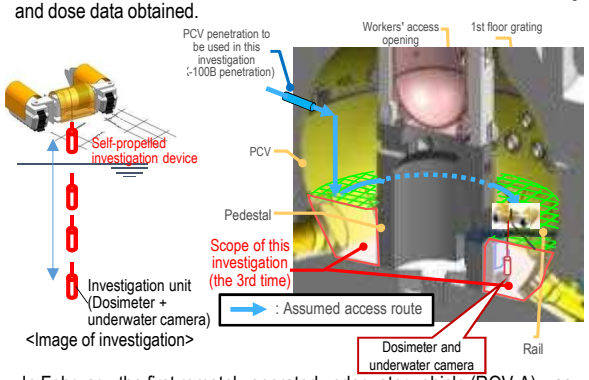
Start of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (within 2021 * The schedule will be extended for about 1 year due to the spread of COVID-19 infections)

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

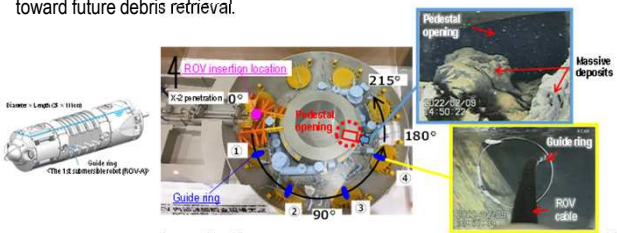
・In April 2015, a device having entered the inside of the PCV via a narrow opening (bore:φ100 mm) collected information such as images and airborne dose inside the PCV 1st floor.

・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, the first remotely operated underwater vehicle (ROV-A) was inserted to install "guide rings" which will facilitate the investigation. As installation of guide rings has been completed, then a detailed investigation will be implemented.
In this investigation, distribution of deposits outside the pedestal and their characteristics or others will also be investigated. The results of these investigations will be utilized in the examination of method and procedures toward future debris retrieval.



<Status inside the PCV (February 9)>

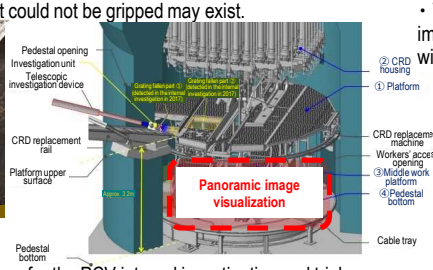
Unit 2 Investigation overview

・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.

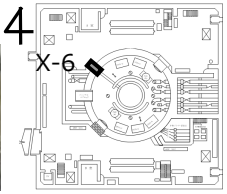

Bottom of the pedestal (after being processed in panoramic image visualization)



・In October 2020, as part of work to prepare for the PCV internal investigation and trial retrieval, a contact investigation to study deposits inside the penetration (X-6 penetration) was conducted, which involved inserting a guide pipe incorporating an investigative unit into the penetration. This confirmed that deposits inside the penetration had not deformed and come unstuck. The investigative information obtained will be utilized in the mockup test of the equipment to remove deposits inside the X-6 penetration.

<Conditions of deposits before and after contact>


<Work in front of the penetration>



<Unit 2 Reactor Building 1st floor Location of the penetration>

Unit 3 Investigation overview

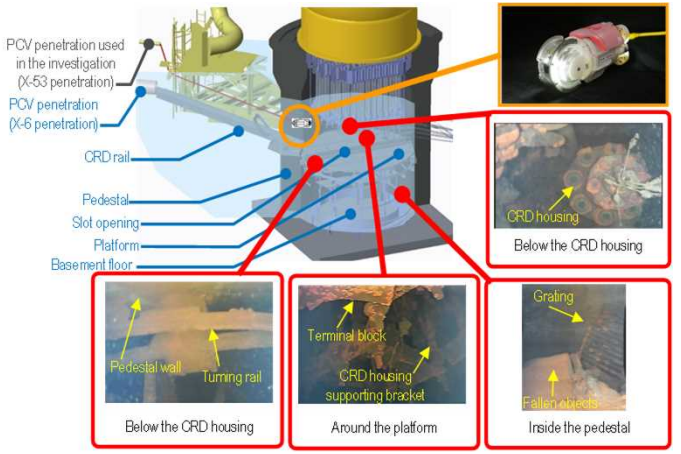
・In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, was investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.

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

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

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

<Conditions inside the pedestal>



Unit 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	- Acquiring images - Measuring the air temperature and dose rate - Measuring the water level and temperature - Sampling stagnant water - Installing permanent monitoring instrumentation
	2nd (2015.4)	Confirming the status of the PCV 1st floor - Acquiring images - Measuring the air temperature and dose rate - Replacing permanent monitoring instrumentation
	3rd (2017.3)	Confirming the status of the PCV 1st basement floor - Acquiring images - Measuring the dose rate - Sampling deposit - Replacing permanent monitoring instrumentation
Leakage points from PCV	- PCV vent pipe vacuum break line bellows (identified in 2014.5) - Sand cushion drain line (identified in 2013.11)	
Evaluation of the location of fuel debris inside the reactor by measurement using muons Confirmed that there was no large fuel in the reactor core. (2015.2-5)		

Unit 2 PCV internal investigation

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

Unit 3 PCV internal investigation

Investigations inside the PCV	1st (2015.10-12)	- Acquiring images - Measuring the air temperature and dose rate - Measuring the water level and temperature - Sampling stagnant water - Installing permanent monitoring instrumentation (2015.12)
	2nd (2017.7)	- Acquiring images - Installing permanent monitoring instrumentation (2017.8)
Leakage points from PCV	- Main steam pipe bellows (identified in 2014.5)	
Evaluation of the location of fuel debris inside the reactor by measurement using muons The evaluation confirmed that no large lump existed in the core area where fuel had been placed and that a portion of the fuel debris potentially existed at the bottom of the RPV. (2017.5-9)		

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

5 Management of solid radioactive waste

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

★ 2017.6 Revision ★ 2018.6 Revision ★ 2019.6 Revision ★ 2020.7 Revision ★ 2021.7 Revision

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

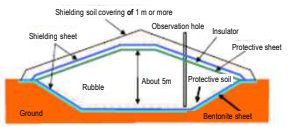
▼ 2012.9 Transfer start of rubble to the soil-covered temporary storage facility

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

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

▼ 2019.6 Start of building construction
1st Large Waste Storage

1st Large Waste Storage Roof construction (from the inside)



<Outline of soil-covered temporary storage facility>

External view of the 9th Solid Waste Storage

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


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

▼ 2018.2 Operation start

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

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

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

▼ 2013.5 Installation work gets underway
Solid Waste Incinerator

▼ 2016.3 Operation start

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


Whole view of Solid Waste Incinerator


Electrical room


Control room

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

▼ 2017.4 Start of pre-work
Additional Solid Waste Incinerator

▼2022.5 Start of operation

2017.10 Installation work gets

▼ 2018.5 Operation start
Large Equipment Decontamination Facility

▼ 2020.9 Start of pre-work
Compaction Facility

Site of Volume Reduction Facility

Present status Note

Storage of rubble and others

Present storage Approx.480,000 m³ (as of 2021.3)

Rubble (combustible), trimmed trees, used protective clothing

Contaminated soil (0.005 - 1 mSv/h)

Rubble (metal, concrete, others)

More than 1 mSv/h

0.005-1 mSv/h

Less than 0.005mSv

Storage of water treatment secondary waste

Estimate for the next decade (or so) Approx.**790,000** m³ (*2)

Approx. 290,000 m³ — To (A) (*1) → Incineration

Approx. 60,000 m³ → Stored and managed in Solid Waste Storage as done for rubble

Approx. 60,000 m³ → Additional Radioactive Waste Incinerator (A) / (B)

Approx. 170,000 m³ — To (A) (*1) → Volume reduction

Approx. 220,000 m³ → Volume reduction

Approx. 6,500 tanks → Treatment measures and others will be examined

Status after a decade

Legend: Newly installed equipment and facility

Incineration

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


Crusher example

- Radioactive Waste Incinerator
- Additional Radioactive Waste Incinerator

Volume reduction

Compaction Facility (scheduled for completion in FY2022)


Concrete crusher example


Metal cutter example

Melting

Melting equipment


Electric furnace example

(*3) Approx. **270,000** m³ (*2)

Storage /management

Solid Waste Storage (Storage capacity: approx. 260,000 m³)

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

Additional Solid Waste Storage
10th-11th
(Scheduled for completion after FY2022)

Based on the estimates for the amount of waste to be generated, the storage capacity (approx. 260,000 m³) will be reached in around 2032. Scope to install an additional solid waste facility and others will be examined

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

Reuse will be examined

Spent Adsorption Vessel Temporary Storage

Large Waste Storage (scheduled for completion in FY2022)
Toward an operation launch within FY2022, installation work is underway


Work of main part

To (B)

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

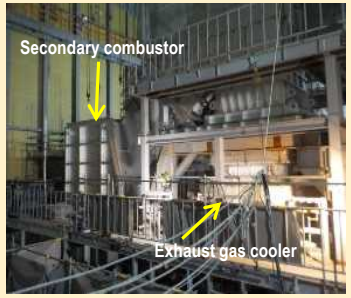
Note: Used protective clothing before incineration and BG-level concrete waste for which treatment and reuse is decided at present are not included.

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

●Efforts to eliminate temporary outdoor storage of rubble and others

To incinerate trimmed trees and combustible rubble (woods, packing materials, paper and others), work to install the Additional Solid Waste Facility is underway.


Whole view of the Additional Solid Waste Incinerator Building



Main equipment

6 Improvement of work environment

October 27, 2022
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.

External view of Access Control Facility

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.

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

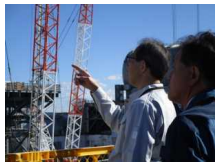
From March 12, 2011, in response to the increased airborne concentration of radioactive materials, instructions were issued to wear full-face masks throughout the Fukushima Daiichi NPS site, excluding the Main Anti-Earthquake Building and the rest house.

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

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

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

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



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

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

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

Changes in operation of controlled area

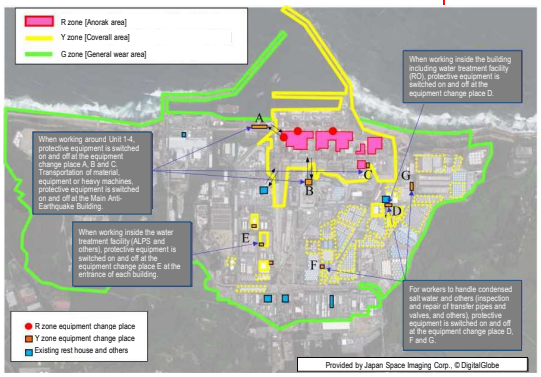
From May 2013, full-face mask unnecessary area was expanded sequentially.

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

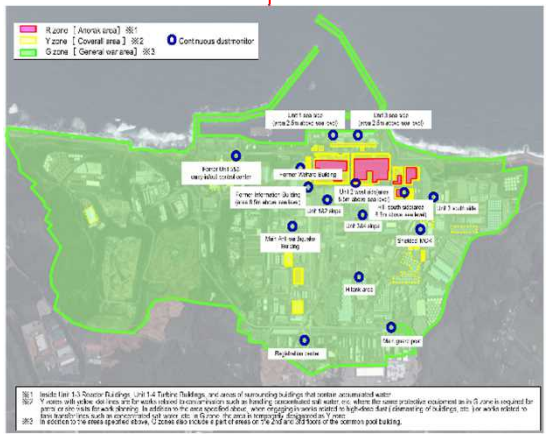
In March 2017, the G-zone area was expanded (to cover 95% of the whole site).

In 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).

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 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.

<Travel survey results of major roads within the site>
The dose rate has been declining every year.
In particular, in the area on the east side of the Turbine Building shown a black dotted line, the dose rate declined by facing related to installation of the seawall as the countermeasure to the Japan Trench tsunami.

FY2020 4th Quarter (measured in 2021.3)

FY2021 4th Quarter (measured in 2022.2)

Provided by Japan Space Imaging Corp., © DigitalGlobe