Outline of Decommissioning, Contaminated Water and Treated Water Management

April 27, 2023
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

Main decommissioning work and steps

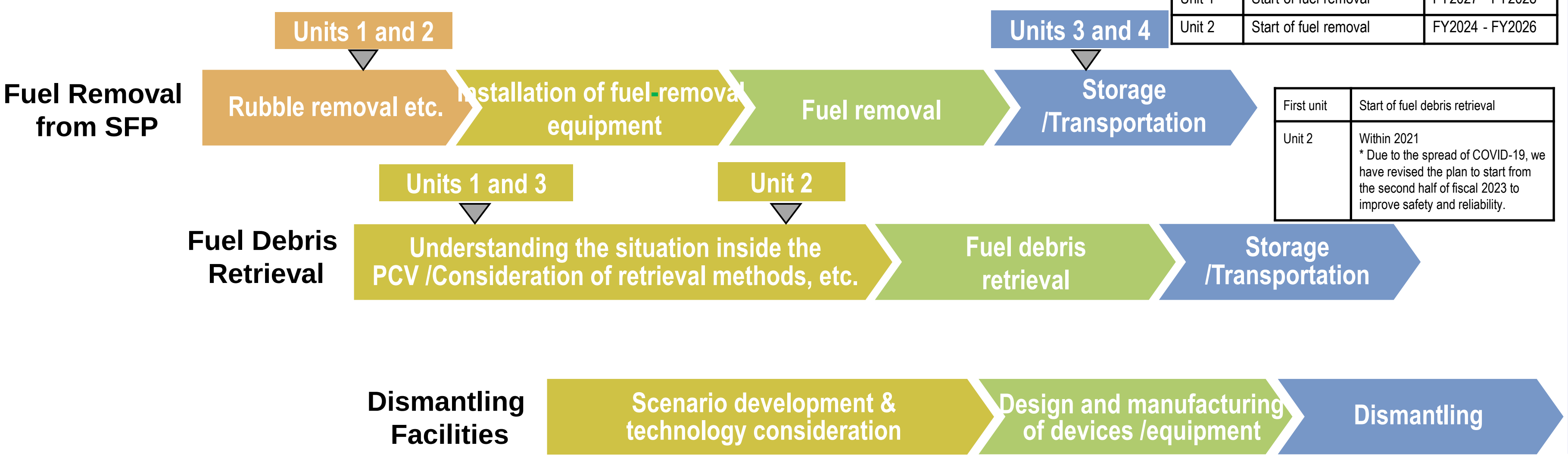
Fuel removal from the spent fuel pool was completed in December 2014 at Unit 4 and on February 28, 2021 at Unit 3.
Work continues sequentially toward the start of fuel removal from Units 1 and 2 and debris (Note 1) retrieval from Units 1-3.

(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

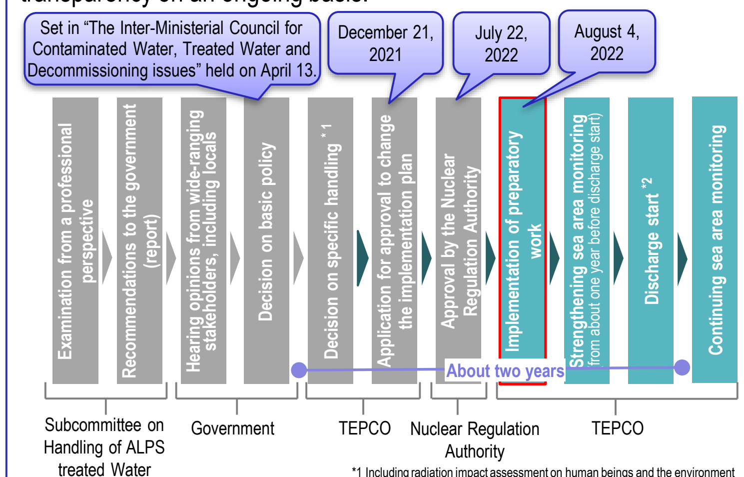
First unit	Start of fuel debris retrieval
Unit 2	Within 2021 * Due to the spread of COVID-19, we have revised the plan to start from the second half of fiscal 2023 to improve safety and reliability.



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.



*1 Including radiation impact assessment on human beings and the environment
*2 Discharges into the sea will be conducted gradually during the initial phase

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.

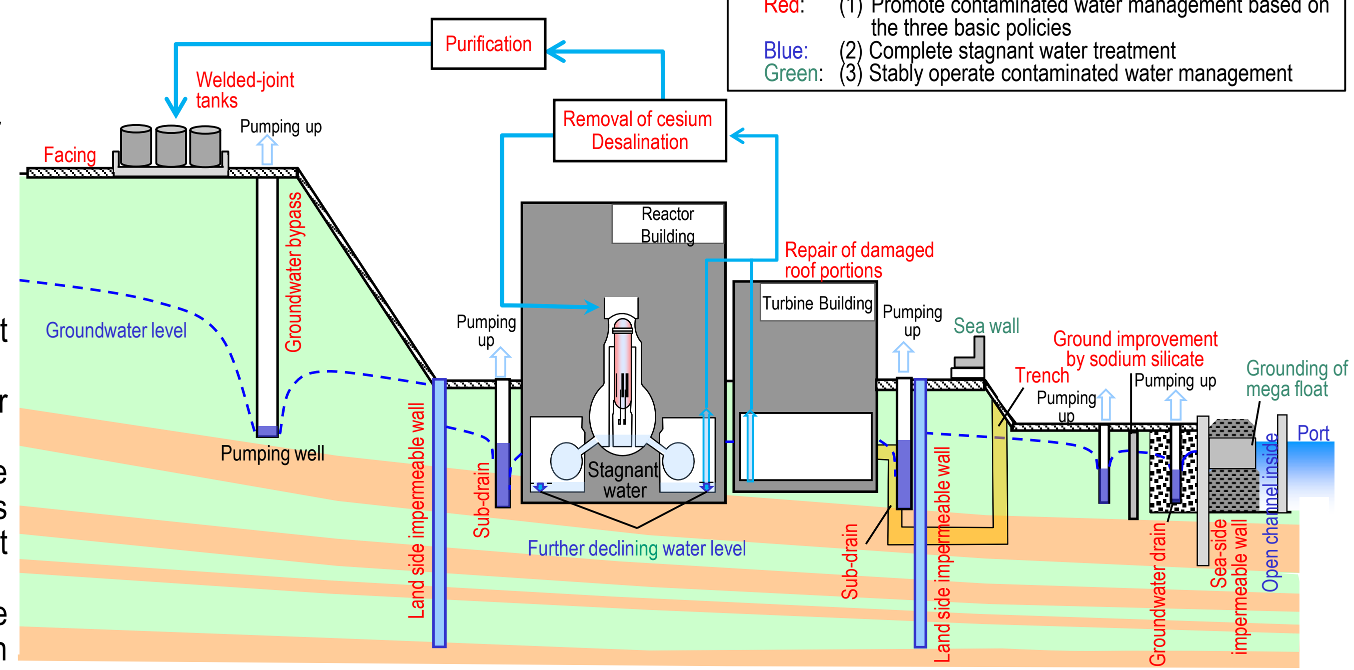
(2) Efforts to complete stagnant water treatment

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

(3) Efforts to stably operate contaminated water management

- 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.

Red: (1) Promote contaminated water management based on the three basic policies
Blue: (2) Complete stagnant water treatment
Green: (3) Stably operate contaminated water management



Progress Status and Future Challenges of the Mid- and-Long-Term Roadmap toward Decommissioning of TEPCO Holdings Fukushima Daiichi Nuclear Power Station (Outline)

Progress status

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

Evaluation of contaminated water generated in FY2022 and future measures to suppress groundwater inflow to buildings

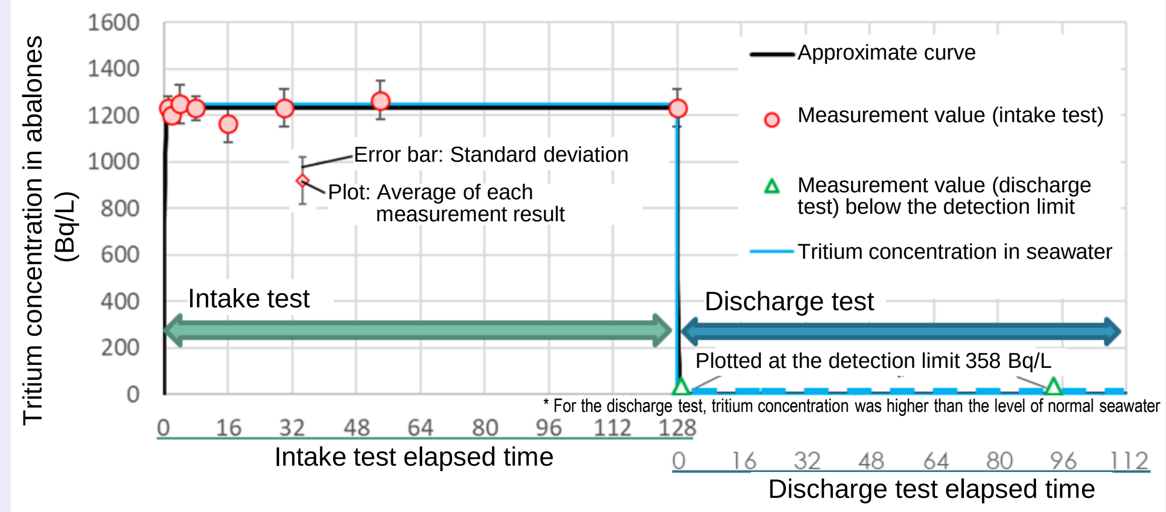
Multiple measures have been implemented to manage contaminated water, including installing a roof on the building to prevent rainwater infiltration and constructing barriers around buildings. Additionally, the rainfall in 2022 was lower (1,192 mm) compared to previous normal years (approximately 1,470 mm), and there were no instances of heavy rain exceeding 100 mm/day. As a result, the amount of contaminated water generated in 2022 was approximately 90 m^3/day, indicating that the inflow of water into buildings was effectively reduced.

Measures such as facing in the west-side area of Unit 3 will continue, and efforts to reduce the generation of contaminated water will be consistently carried out.

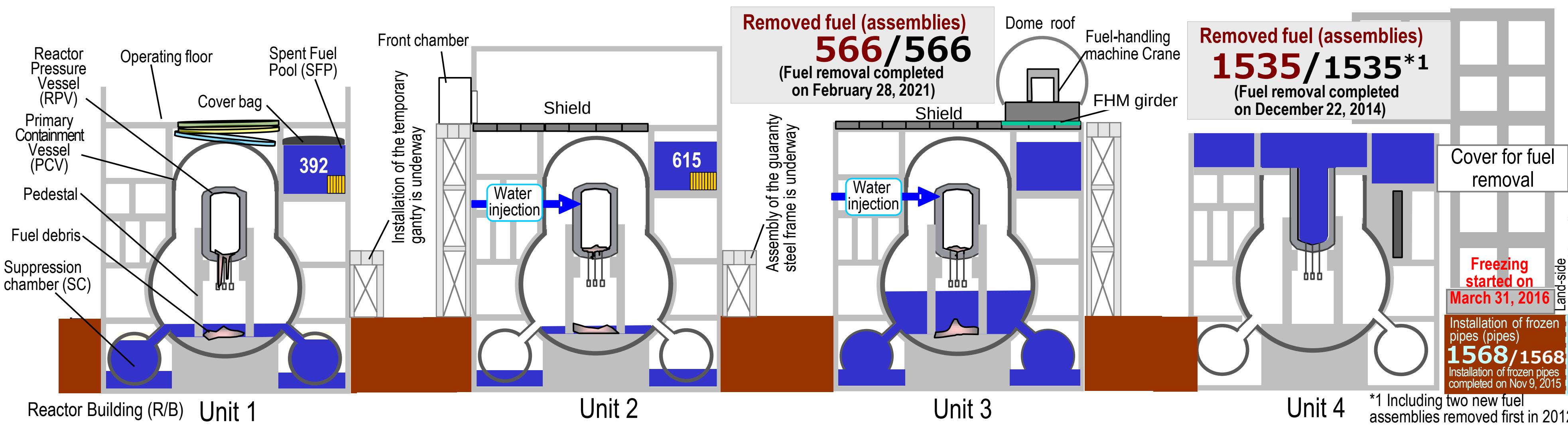
Progress status of the rearing test of marine organisms

In the abalone testing, it was confirmed that when abalones were raised in seawater containing ALPS treated water (with a tritium concentration of less than 1,500 Bq/L), the tritium levels in their bodies did not exceed the concentration in their growing environment. Moreover, when the abalones were transferred to regular seawater, the tritium concentration in their bodies decreased. TEPCO will continue to provide easy-to-understand information on this matter.

Live video of marine organisms rearing test
https://www.youtube.com/channel/UCLEn8NHHX2WrMvn6ZYfAjJA



< Tritium concentration in abalones >

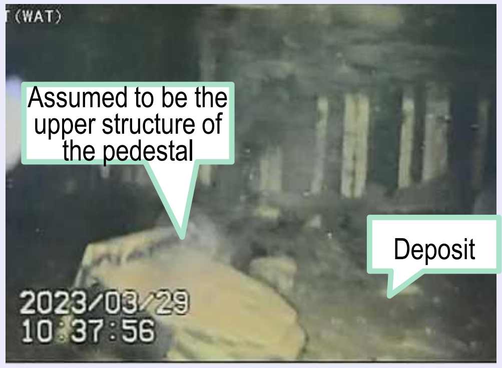


Unit 1 Status of the Primary Containment Vessel (PCV) internal investigation (the latter half)

Between March 28 and 31, an investigation inside the pedestal by the ROV-A2 was conducted.

The investigation confirmed a deposit of less than 1 meter in height across the floor and a fallen portion of the pedestal's upper structure. Additionally, no reflection from the structure expected in the upper part of the pedestal was observed, and a part appeared to be a black space. Consequently, it was assumed that a hole existed at the bottom of the Reactor Pressure Vessel.

This investigation also confirmed that some of the lower concrete inside the pedestal was missing, exposing the bar arrangement. Based on these findings, a seismic assessment will be conducted for the pedestal. If the potential safety implications of losing the support function are identified, measures to mitigate any influence will be explored.



<Status of the pedestal bottom >

IAEA published the Review Report (2nd) concerning the safety of ALPS treated water

The IAEA Review Report (2nd) concerning the safety of ALPS treated water and based on the November 2022 review was published on April 5.

The report contains points of discussions between the IAEA Taskforce, the Ministry of Economy, Trade and Industry and TEPCO as well as findings for each technical subject.

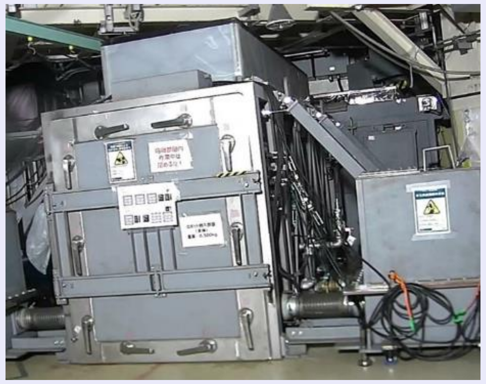
Overall, no major problems were pointed and the report indicated the following: instructions in the 1st review in February 2022 were appropriately reflected, understanding on the IAEA side was deepened and no additional mission would be necessary.

Unit 2 Status of preliminary work for the PCV internal investigation and trial retrieval

In preparation for the investigation inside Unit 2's Primary Containment Vessel (PCV) and the trial retrieval, an isolation room was installed on-site and completed on April 14.

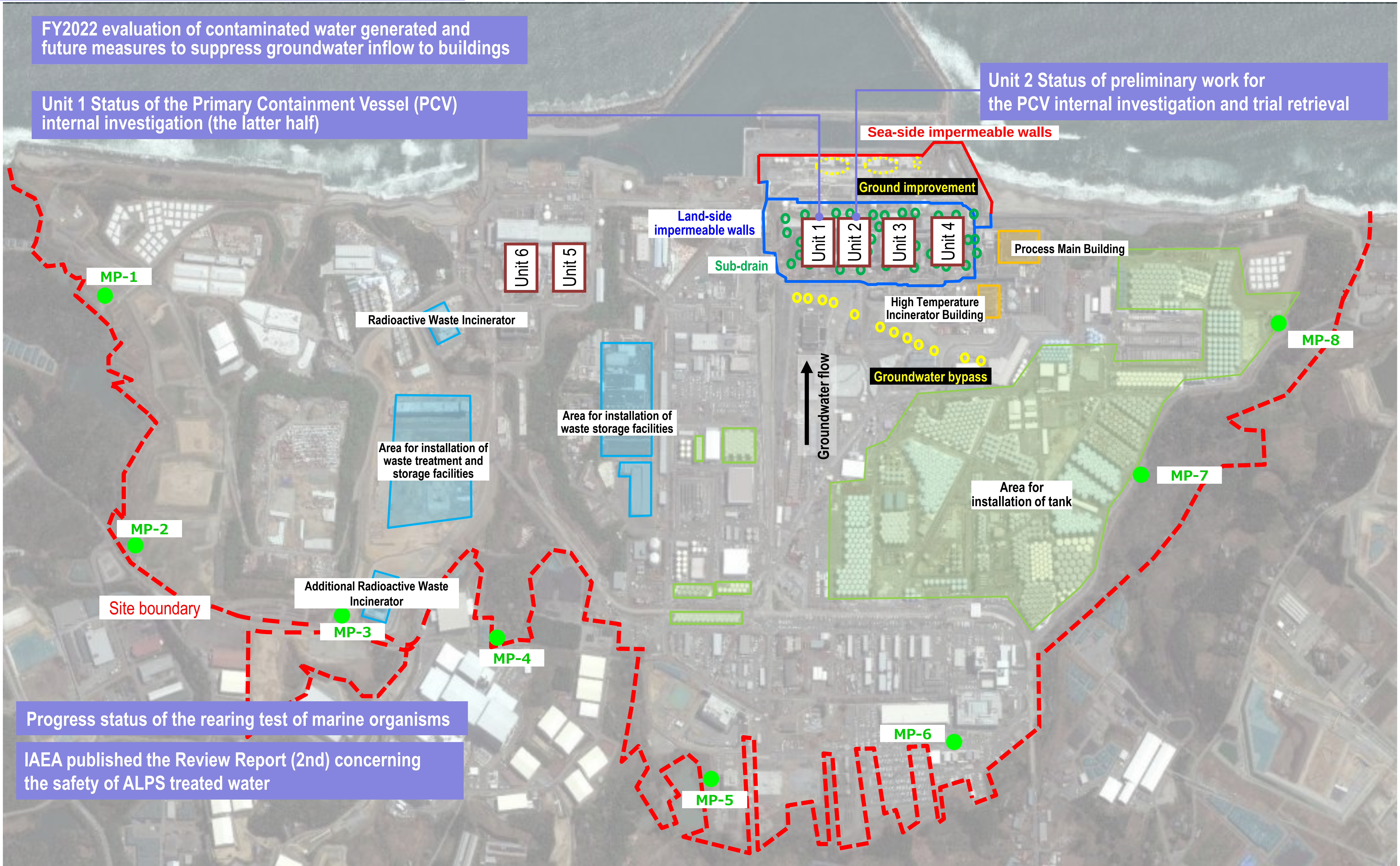
The new isolation room will serve as a boundary to contain gas inside the PCV when opening the hatch for the X-6 penetration, which will be the entry point for the robot arm.

While the hatch is open, measures will be taken to prevent the spread of contamination, such as increasing the pressure inside the isolation room to prevent gas leakage from the PCV and installing filtered local exhaust fans. Moreover, dust concentration will be monitored during the work to ensure that safety remains a top priority.



< Installation of the isolation room >

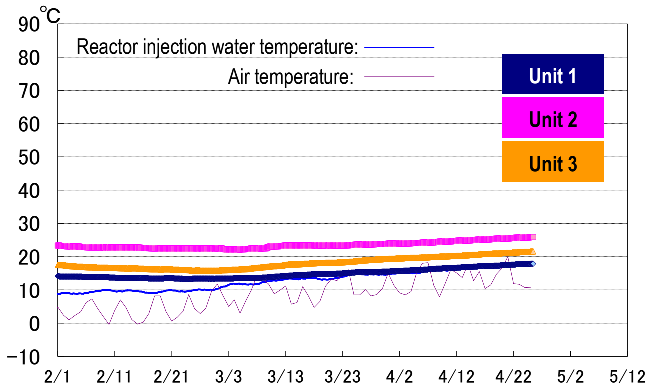
Major initiatives – Locations on site



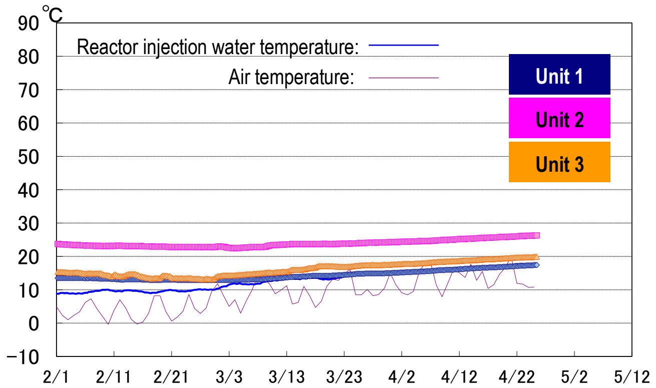
I. Confirmation of the reactor conditions

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

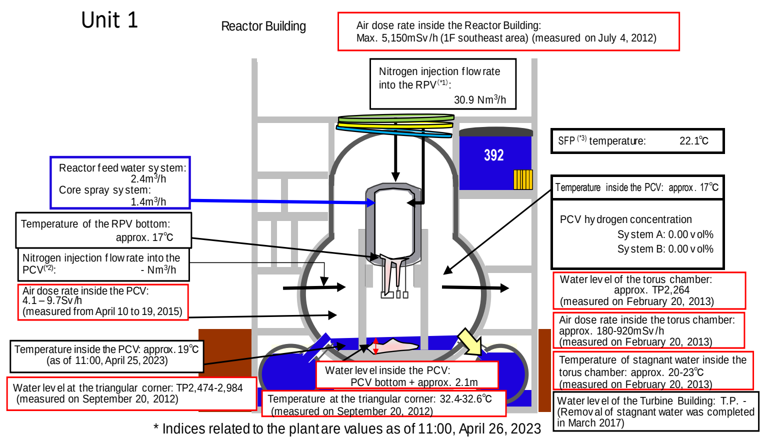


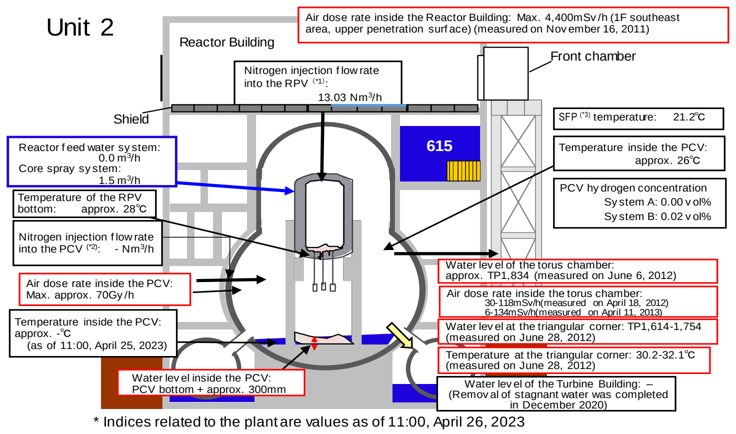
RPV bottom temperatures (recent quarter)

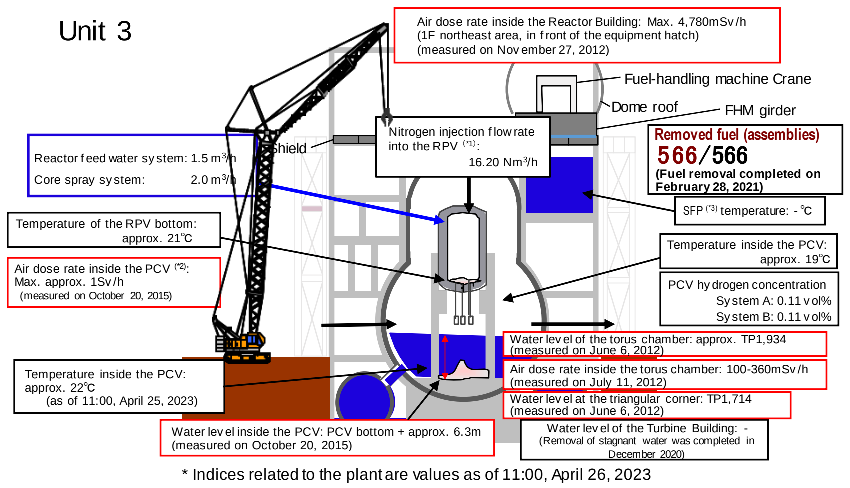


PCV gas phase temperatures (recent quarter)

*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.





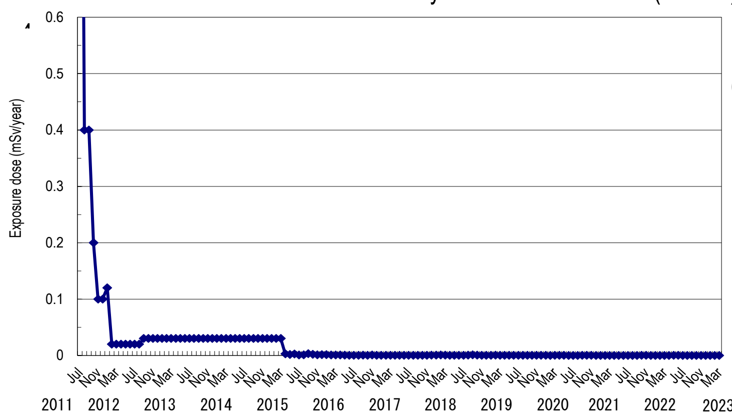


(*1) RPV (Reactor Pressure Vessel)
(*2) PCV (Primary Containment Vessel)
(*3) SFP (Spent Fuel Pool)

Release of radioactive materials from the Reactor Buildings

As of March 2023, 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. 2.2×10^{-12} Bq/cm³ and 1.5×10^{-12} Bq/cm³ for Cs-134 and -137 respectively, while the radiation exposure dose due to the release of radioactive materials there was less than 0.00004 mSv/year.

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



(Reference)

* The concentration limit of radioactive materials in the air outside the surrounding monitoring area:
  [Cs-134]: 2 x 10^{-5} Bq/cm³
  [Cs-137]: 3 x 10^{-5} Bq/cm³
* Data of Monitoring Posts (MP1-MP8).
  Data of Monitoring Posts (MPs) measuring the air dose rate around the site boundary showed 0.315– 1.066 μSv/h (March 29 – April 25, 2023).
  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.

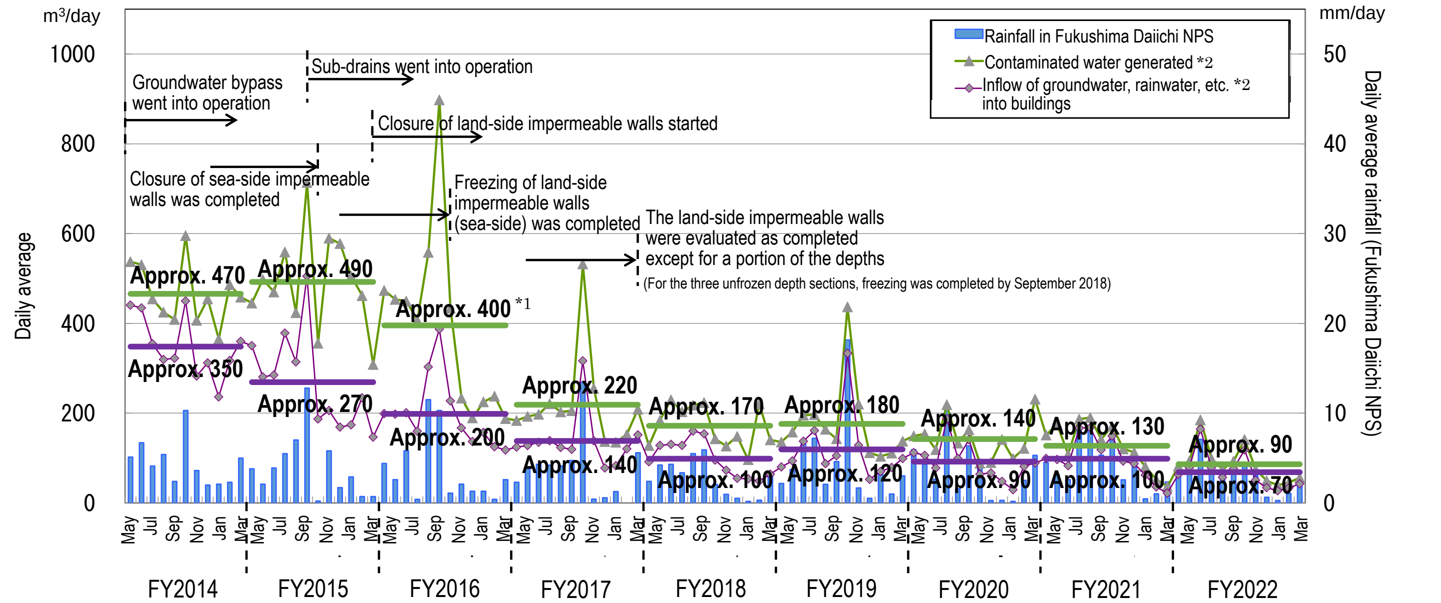
Based on the above, it was confirmed that the comprehensive cold shutdown condition had been maintained and the reactors remained in a stabilized condition.

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 and due to less rainfall than in previous normal years without concentrated heavy rain of 100 mm/day or more, the amount of contaminated water generated within FY2022 declined to approx. 90 m³/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 April 18, 2023, 2,133 release operations had been conducted.
  The water quality of all temporary storage tanks satisfied the operational target.

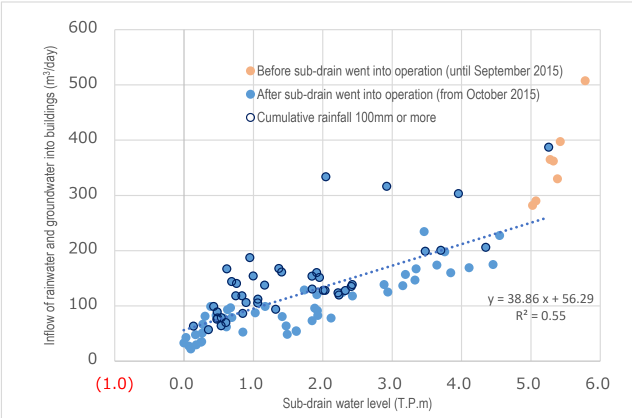


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 sub-drains

➢ 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 March 2023, 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 March 2023, 40% 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 each year due to the land-side impermeable walls and the decline in the set water level of the sub-drains. On the mountain side, 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 to the T.P. 2.5 m area.

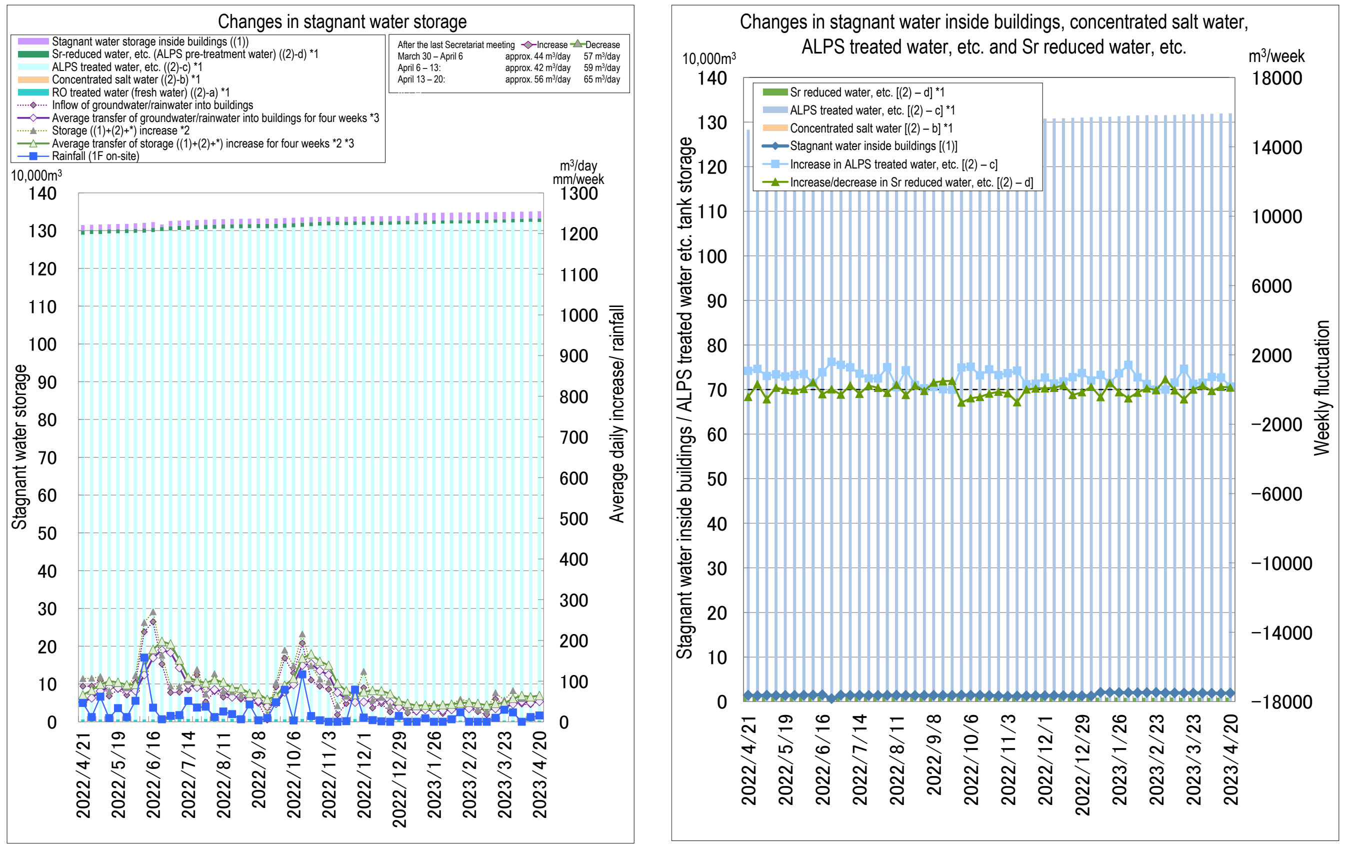
➢ Operation of the multi-nuclide removal equipment and other water-treatment facilities

- Regarding the multi-nuclide removal equipment (existing), hot tests using radioactive water had been conducted (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 (NRA) and the entire pre-service inspection was completed. The multi-nuclide removal equipment (additional) went into full-scale operation from October 16, 2017. Regarding the multi-nuclide removal equipment (high-performance), hot tests using radioactive water had been conducted from October 18, 2014. On March 2, 2023, a pre-service inspection certificate was granted by the NRA and the entire pre-service inspection was completed.
- As of April 20, 2023, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 495,000, 755,000 and 104,000 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 April 20, 2023, approx. 712,000 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 April 20, 2023, approx. 879,000 m^3 had been treated.

As of April 20, 2023



(1): Stagnant water storage inside buildings (Units 1-4, Process Main Building, High Temperature Incinerator Building, Waste Liquid Supply Tank, SPT (A), SPT (B), Units 1-3 CST, buffer tank)
(2): Units 1-4 tank storage ([(2)-a RO treated water (fresh water)] + [(2)-b Concentrated salt water] + [(2)-c ALPS treated water, etc.] + [(2)-d Sr-reduced water, etc. (ALPS pre-treatment water)]
*: Water amount from tank bottom to water-level gauge 0% (DS)
*1: Water amount for which the water-level gauge indicates 0% or more
*2: Calculated in the method of contaminated water generated [(Inflow of groundwater/rainwater into buildings) + (other transfer) + (chemical injection into ALPS)]
*3: Average transfer of storage increase and groundwater/rainwater into buildings for four weeks was added (November 24, 2022)

Figure 3: Status of stagnant water storage

➢ Progress status of tsunami countermeasures

- To prepare for an imminent emergency of the Japan Trench tsunami, construction to install the "Japan Trench Tsunami Seawall" started from June 2021. As of April 2023, construction of the seawall and road on the Units 1-4 side and the south side of Unit 4 is underway.
- The Japan Trench Tsunami Seawall will be completed in the 2nd half of FY2023.
- Ongoing work to install the sub-drain and the water collection facilities, which are currently installed in the area of 2.5 m above sea level, also in the area of 33.5 m above sea level continues. After dismantling the heavy oil tanks on-site within FY2023, relay tanks will be installed.
- For the high ground area (33.5 m above sea level) to which water collection facilities will be transferred, after completing the area preparation, work to improve the ground started from October 2022. At present, construction of the concrete base prior to installing the water collection facilities is underway.
- Subsequently, according to the installation of the sub-drain and the water-collection facilities, work to install pipes to transfer from the sub-drain relay tanks to the water-collection facilities, pumps to transfer to the purification equipment, power supply and other facilities will be implemented sequentially.

➢ Measures to improve the reliability of the ALPS outlet sample tanks (including flanged tanks)

- There is a system to treat water in each of the existing, additional and high-performance ALPS and then temporarily store it in sample tanks dedicated for each ALPS. To prioritize water treatment, the existing ALPS needs to be operated with flanged sample tanks.

- To improve the reliability of the existing ALPS operation (to ensure operation in the case of trouble in the sample tank due to the effects of sample earthquakes or other factors) and for other purposes, "connecting pipes" to transfer water treated in the existing ALPS to sample tanks (welded-joint tanks) for additional and high-performance ALPS.
- The pre-service inspection was completed and went into operation from April 18, 2023. Meanwhile, considering the operation of each ALPS, flanged sample tanks remain in use after the connecting pipes go into operation. The storage capacity of ALPS treated water tanks (1.373 million m^3) remained unchanged after operation got underway.

➢ 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 over the past two years and was also 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 applied to the past fluctuation in seawater around the Fukushima Daiichi Nuclear Power Station. However, it remained constant relative to measurement benchmarks over the past two years and at new measurement points also low within the fluctuation range of seawater in Japan*. For tritium, monitoring with a lower detection limit has been conducted since April 18, 2022.
- Both concentrations of tritium and Cesium-137 in seawater within 20km of the coast had remained constant over the past two years 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 two years within the fluctuation range of seawater in Japan*.

  * : The range of the minimum – maximum values detected during April 2019 – March 2022 was as follows 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/

- The concentration of tritium in fish sampled at the sampling point T-S8 had remained constant over the past two years. The concentration of tritium in fish sampled at new sampling points, including those for which the analytical value was verified, remained low within a similar fluctuation range for seawater in Japan*. Other measurement data of fish is being verified.

  * : The range of the minimum – maximum values detected during April 2019 – March 2022 was as follows in the database above:

    In Japan (including off the coast of Fukushima Prefecture)
    Tritium concentration (tissue free water type): 0.064 – 0.13 Bq/L

- The concentration of iodine 129 in seaweed sampled since July 2022 had been below the lower detection limit (< 0.1 Bq/kg (raw)). The concentration of tritium had not been analyzed due to a lack of sufficient sample population for reanalysis via the improved method following a review of the analytical procedures and based on the verification results of fish tritium analysis data. The fluctuation range of iodine 129 in seaweed in Japan had been within the range of minimum – maximum values detected during April 2019 – March 2022 in the database below.

    In Japan Iodine 129 concentration: 0.00013 Bq/Kg (raw) – 0.00075 Bq/Kg (raw)

➢ 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, 2022 from around the K4 area tanks. The pre-service test started from January 16, 2023.
- For the discharge facility, drilling of the discharge tunnel was completed on April 26, 2023 (tunnel length: approx. 1,031 m).
- For the discharge shaft (upstream pool) of the dilution facility, installation and assembly of blocks (manufactured outside the site) started from January 12 and concrete placement of the bottom plate (bottom) and others, from February 9. The installation and assembly and concrete placement were completed. Subsequently, waterproof coating is underway.
- In the seaside area for Units 5 and 6, scaffolding for heavy-duty machines was completed on December 29, 2022, and the scaffold has been utilized, mainly to construct the upper stream pool from January 5, 2023. Sedimentation inside the intake open channels was removed (dredging) and the partition weir was built (completed on April 13) simultaneously. From April 18, a portion of the anti-permeation work started.
- At sea, the temporary surveying tower, which is equipped with the outlet caisson, was removed. The surveying tower was split into upper and lower parts. Removal of the upper part was completed on April 9 and the lower part, on April 13.

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 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. 83%, 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.
- A temporary gantry is being installed from the portion where anchors and base plates near the top of the temporary gantry are installed.
- Before the forthcoming drilling of anchors near the operating floor level, removal of rubble which would interfere with the drilling started in advance from March 2023.

➢ Main work to help spent fuel removal at Unit 2

- Work to remove the control room of the fuel-handling machine (hereinafter FHM control room), which started from August 2022, was completed in November 2022. (Work to transport dismantled rubble was completed on January 31)
- From February 6, 2023, work to dismantle the existing facility on the south side commenced and was completed in March 20. Work to collect and transfer the dismantled rubble continues.
- Outside the building, the erection of a steel structure commenced from January 23, 2023.
- Outside the site, before erecting the steel structure on-site, ground assembly continues.

Retrieval of fuel debris

➢ Unit 1 PCV internal investigation (the latter half)

- From March 28, 2023, the investigation inside the pedestal by ROV-A2 started and was completed on March 31.
- In this investigation, it was confirmed that a portion of lower concrete inside the pedestal was lost, and the bar arrangement was exposed. Based on the investigative results, a seismic assessment of the pedestal will be conducted. After confirming the potential influence on safety in the case where the support function is lost, measures to alleviate the influence will be examined.

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

- Regarding the robot arm, by correcting the difference between the information acquired through the ongoing Naraha mockup test simulating the site, which had been conducted since February 2022 and the pre-simulation results, to reduce the risk of contact while retrieving the fuel debris, correction of the control program and other improvements are currently underway. (Improvements: correcting and improving the accuracy of the control program, increasing the arm operation speed, improving the cable-mounting tool, increasing visibility, improving the gripper, etc.)

- As preliminary work of the Unit 2 site, work to install the isolation room toward opening the X-6 penetration hatch commenced from November 2021. In response to the damage to the rubber box in the isolation room, bending of the guide roller (earthquake response), misalignment of the shield door, damage to the pressing mechanism part and others having occurred during the work, countermeasures were implemented, and the installation of the isolation room was completed in April 2023. Subsequently, removal of deposits inside X-6 penetration and other work are scheduled. Work will proceed safely and carefully.

➢ Progress toward resuming work to remove a portion of the Unit 1/2 SGTS pipes

- Work to remove the pipes of the Standby Gas Treatment System (SGTS) was resumed from April 19, but suspended due to trouble involving the pipe support cutter.
- After conducting the cause analysis of the trouble, recurrence prevention measures and inspection of the facility, work will resume. Work will proceed safely and carefully prioritizing safety.

➢ Status of the on-site investigation toward dismantling the Units 3/4 exhaust stack

- To secure the site for the fuel debris retrieval equipment, the Units 3/4 exhaust stack will be dismantled and removed.
- The sections to be dismantled are the SGTS pipes on the ground and inside the Units 3/4 exhaust stack, the main exhaust duct and SGTS pipes from the Units 3/4 exhaust stack until the Unit 4 T/B Building.
- As part of the on-site investigation before removing the Units 3/4 exhaust stack, the dose rate inside the exhaust stack and SGTS pipes will be measured. After testing using the mockup, assembly of the house, boring for the Units 3/4 exhaust stack and SGTS pipes and investigation will be conducted in May and June.
- In the Units 3/4 exhaust stack, the air dose rate is lower compared with the Units 1/2 exhaust stack, which also means a lower contamination risk. However, to thoroughly ensure work safety, a dust prevention house and local exhaust fans will be installed before the investigation, as was done for the Units 1/2 exhaust stack.

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

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

➢ Management status of rubble and trimmed trees

- As of the end of March 2023, the total storage volume for rubble of concrete and metal etc. was approx. 388,200 m^3 (+60,900 m^3 compared to the end of February with an area-occupation rate of 76%). The total storage volume of trimmed trees was approx. 118,700 m^3 (-200 m^3 with an area-occupation rate of 68%). The total storage volume of used protective clothing was approx. 15,800 m^3 (+1,100 m^3, with an area-occupation rate of 62%). The total storage volume of radioactive solid waste (incinerated ash and others) was approx. 38,100 m^3 (a slight increase, with an area-occupation rate of 60%). The increase in rubble was attributable to the setting sift of the temporary deposits awaiting temporary storage to the temporary storage area. On March 30, 2023, the temporary deposits awaiting temporary storage were eliminated by setting them as the temporary storage area or eliminating them.

➢ Management status of secondary waste from water treatment

- As of April 6, 2023, the total storage volume of waste sludge was 474 m^3 (area-occupation rate: 68%), while that of concentrated waste fluid was 9,407 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 5,550 (area-occupation rate: 88%).

➢ Progress status concerning the optimization of waste management

- On March 30, 2023, the temporary deposits awaiting temporary storage were eliminated by setting a new temporary storage area.
- This helped achieve a state where only temporary accumulation for separation, containment or other waste output generated in construction was handled.
- Patrols, drone surveys, container inspections, monitoring in case of emergency and other measures will continue to maintain optimal management state.

➢ Status of trouble shooting of the Radioactive Waste Incinerator

- On February 10 and 11, during the annual inspection, a rust-like powder deposit was detected in the lower part of the exhaust gas filter casing as well as corrosion and thinning in the casing base material under the powder. Moreover, a hole penetrating the casing was also detected in one of these filters.
- Analytical results of the powder confirmed sulfuric acid and chloride ion in addition to the iron oxide base material. It was considered that the corrosion had intensified due to condensation containing acid having been generated in parts where the exhaust gas temperature tended to decrease.
- Inspection inside the system also detected similar corrosion and parts of other equipment requiring repair.
- The exhaust gas filter casing and each part will be repaired and restored in early July (the process is under consideration).

Reduction in radiation dose and mitigation of contamination

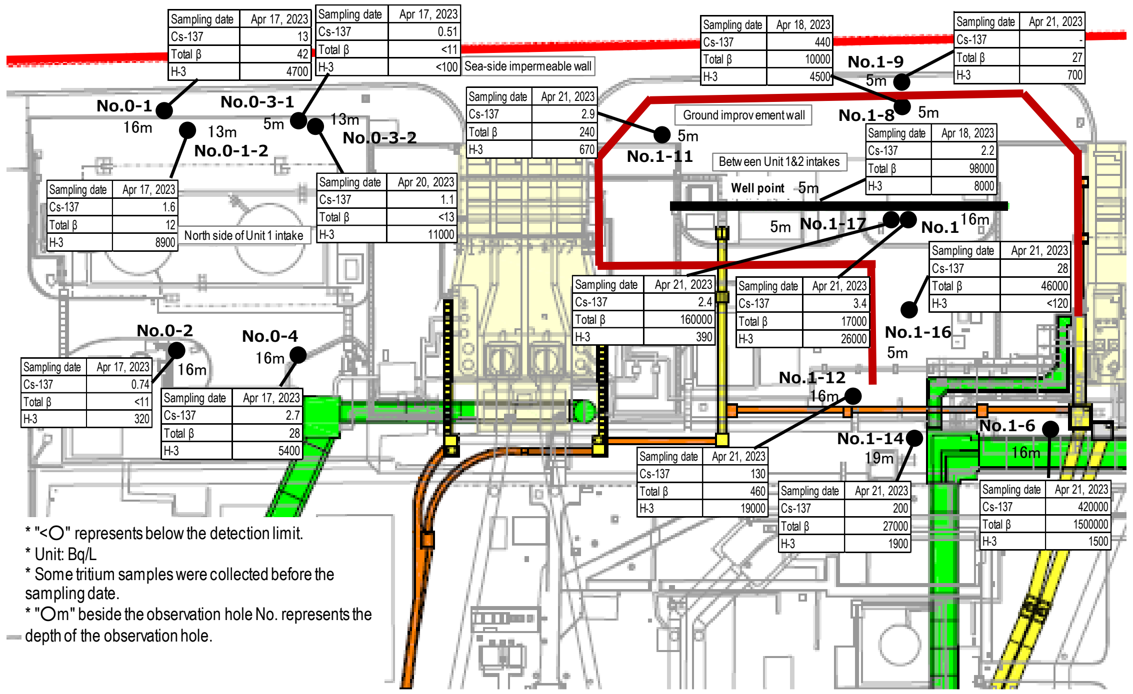
Effective dose-reduction at site boundaries and purification of port water to mitigate the impact of radiation on the external environment

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

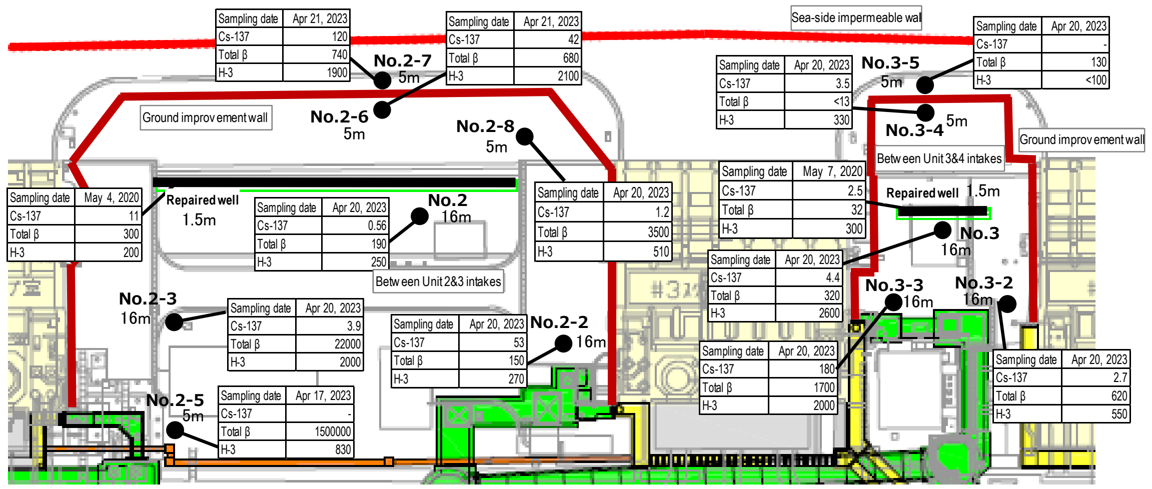
- In the Unit 1 intake north side area, the H-3 concentration was below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or has been declining overall. The concentration of total β radioactive materials has remained constant overall but increased temporarily from 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 carefully monitored.
- In the area between the Unit 1 and 2 intakes, the H-3 concentration has remained below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing or declining at Nos. 1-14, 1-16 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 carefully monitored.
- In the area between the Unit 2 and 3 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has 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 No. 2-5. The trend continues to be carefully monitored.
- In the area between the Unit 3 and 4 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but has been increasing or declining at many observation holes, including Nos. 3-4 and 3-5. The trend continues to be carefully monitored.
- In the groundwater on the east side of the Turbine Buildings, as with the total β radioactive materials, the concentration of cesium has also remained constant as the overall area but been increasing or declining and exceeded the previous highest record at some observation holes. Investigations into the fluctuation are underway for Nos. 0-3-2, 1, 1-6, 2-5, 2-6 and 3-3.
- The concentration of radioactive materials in drainage channels has remained constant overall, despite increasing during rainfall. In Drainage Channel D, drainage of the low-dose area on the west side of the site started to pass from August 30, 2022 and the concentration has remained low. From November 29, 2022, continuous monitors were installed and drainage around the Units 1 and 2 switch yard started to pass.
- In the open channel area of 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 was 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

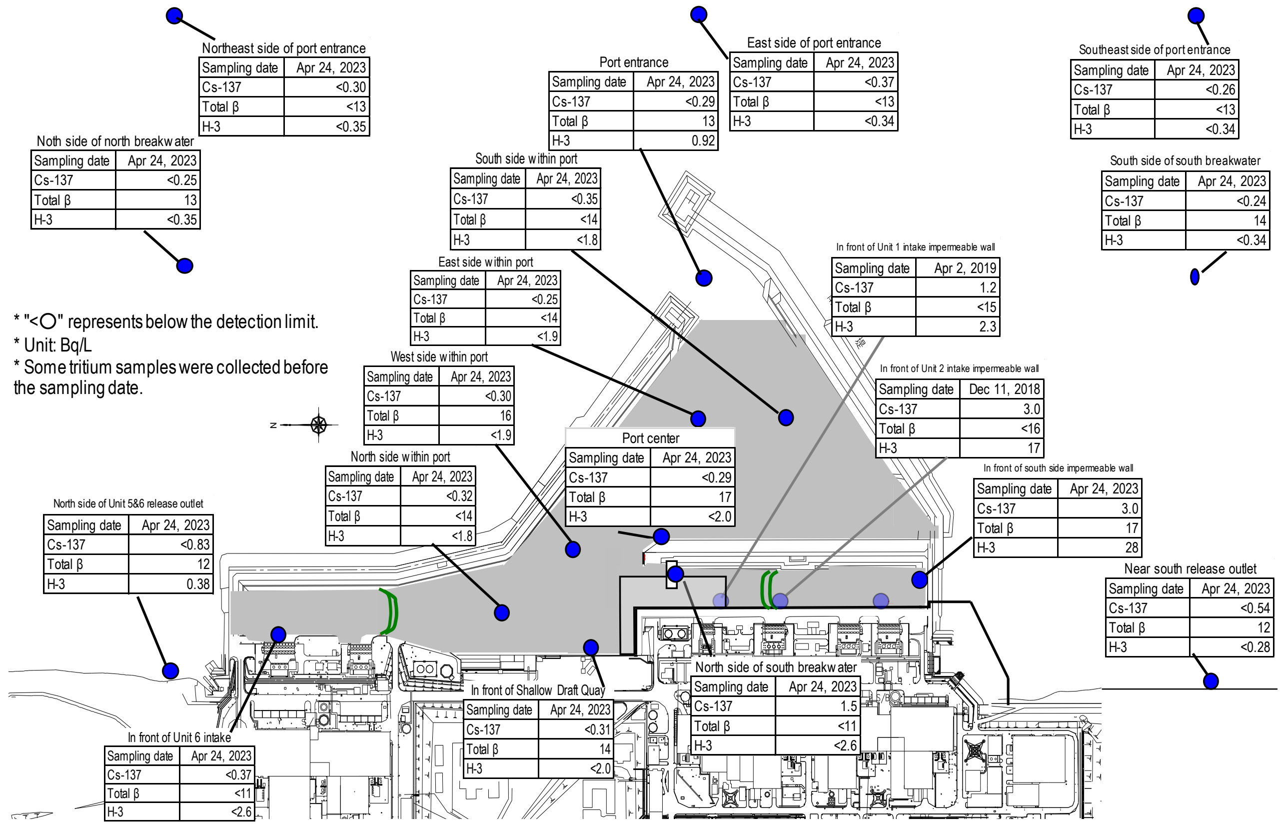


Figure 5: Seawater concentration around the port

➢ Status of the dose rate inside the Fukushima Daiichi Nuclear Power Station

- To improve the work environment inside the Fukushima Daiichi Nuclear Power Station, removal of surface soil, shielding and other measures have been implemented sequentially from areas with many workers to reduce the dose rate.
- The average dose rate of 1m above the surface around Units 1-4 was similar to that in FY2022 in the area 2.5m above sea level and declined from 99 to 53 μSv/h in the area 8.5m above sea level. The main works considered to contribute to the dose rate reduction include the removal of buried rubble on the north side of Unit 4 and rubble removal in the shed of the Unit 3 Turbine Building.
- Periodical dose rate measurement and efforts to determine the status will continue to improve the on-site work environment.

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 December 2022 to February 2023 was approx. 9,600 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,700). 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 May 2023 (approx. 4,000 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 4,600.
- The number of workers from both within and outside Fukushima Prefecture increased slightly. The local employment ratio (cooperating company workers and TEPCO HD employees) as of March 2023 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.

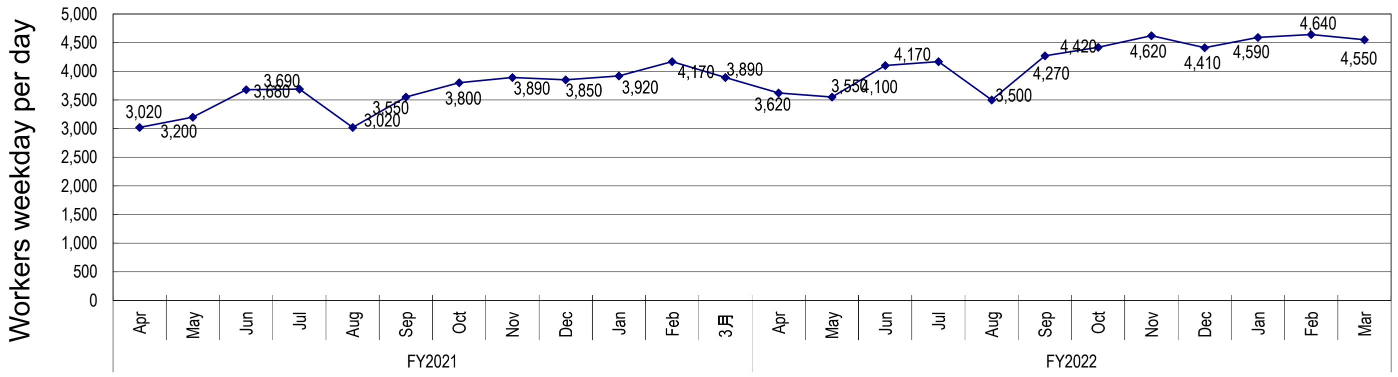


Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

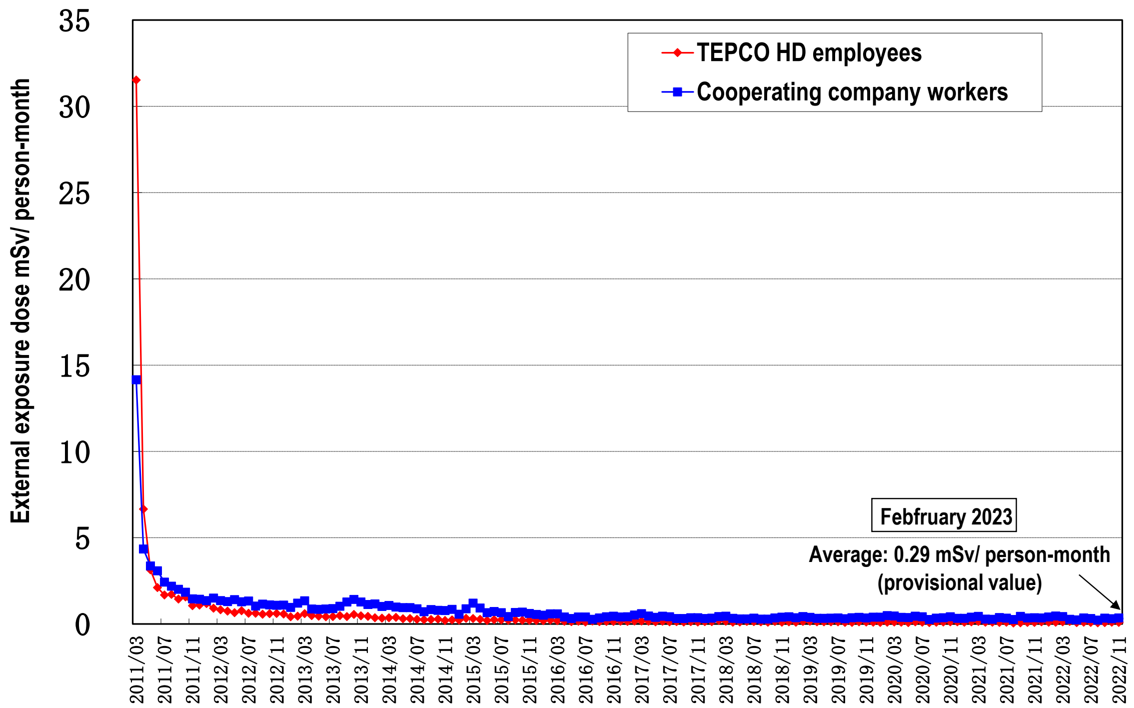


Figure 7: Changes in monthly average exposure dose of individual worker
(monthly exposure dose since March 2011)

➢ Review of countermeasures to suppress the spread of COVID-19 infections

- At the Fukushima Daiichi Nuclear Power Station, in accordance with the TEPCO HD policy, each of the countermeasures to suppress the spread of infections will be abolished in principle from May 8, 2023. However, from the perspective of BCP (business continuity plan), part of the countermeasures to suppress the spread of infections within the workplace will continue for the time being, including mask wearing in crowded and closed places, a gradual review of operations for commuting and on-site buses and avoidance of contact with duty staff.
- Based on the social trend, the infection status within the workplace and other conditions, the entire abolishment, including for duty staff after May 8 and by around the end of June, was considered.
- Basic countermeasures (visiting medical institutions when feeling unwell, ventilation, avoidance of the "Three Cs," frequent handwashing, etc.) will continue to be implemented appropriately by each worker and TEPCO will proceed with decommissioning while prioritizing safety.

➢ FY2022 accident occurrence status and FY2023 safety activity plan

- The number of work accidents in FY2022 increased slightly to 23 from 22 the previous fiscal year. The number of accidents remained high. Issues need to be analyzed and ongoing accident prevention measures must continue to be reviewed and improved. There were three serious injuries (incapacitating workers for 14 days or more).
- The number of heat stroke cases in FY2022 increased to ten (degree-I: six cases; dehydration: four cases) from eight (degree-I: eight cases) in FY2021. In FY2022, as in the previous year, there were no serious heat stroke cases of degree-II or more. As a characteristic in FY2022, there were cases during work with multiple conditions among "work wearing full-face masks," "outdoor work" and "workers with disease affecting heat stroke occurrence" (such as high blood pressure). Strengthened management of work with multiple conditions will be reflected in the heat-stroke prevention plan.
- In FY2023, as in FY2022, "efforts to thoroughly ensure safety actions" and "efforts to conduct safety activities together with partners (prime contractors) and TEPCO" continue to be set as the focused activities. In particular, for the first focused activity, by thoroughly eliminating on-site risks through a series of safety management measures, including "on-site KY" and "after KY," any accidental injuries or fatalities will be prevented.

➢ 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 third quarter (October – December) 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 second quarter in FY2022 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.

➢ Measures to prevent infection and expansion of influenza and norovirus

- Since November 2022, measures for influenza and norovirus have been implemented, including free influenza vaccinations (subsidized by TEPCO HD) at medical clinics around the site (from October 11, 2022 to January 28, 2023) for cooperating company workers. As of January 28, 2023, a total of 4,696 workers had been vaccinated. In addition, a comprehensive range of other measures is also being implemented, including daily actions to prevent infection and expansion (measuring body temperature, health checks and monitoring infection status) and response after detecting possible infections (swift exit of possible patients and control of entry, mandatory wearing of masks in working spaces, etc.).

➢ Status of influenza and norovirus cases

- Until the 16th week of 2023 (April 17-23, 2023), 25 influenza and four norovirus infections were recorded. The totals for the same period for the previous season also showed no influenza and seven norovirus infections.

Note: The above data is based on reports from TEPCO HD and cooperating companies, which include diagnoses at medical clinics outside the site.
The subjects of this report were cooperating company workers and TEPCO HD employees in Fukushima Daiichi and Daini Nuclear Power Stations.

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 April 10-24)"; unit (Bq/L); ND represents a value below the detection limit

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.

Summary of TEPCO data as of April 25, 2023

Cesium-134	ND(0.30)
Cesium-137	ND(0.29)
Total β	17
Toritium	ND(1.9)

*1

Cesium-134 :	3.3	(H25/12/24)	→	ND(0.34)	Below 1/9
Cesium-137 :	7.3	(H25/10/11)	→	ND(0.29)	Below 1/20
Total β	: 69	(H25/8/19)	→	13	Below 1/5
Toritium	: 68	(H25/8/19)	→	0.67	Below 1/100

Cesium-134 :	3.3	(H25/10/17)	→	ND(0.36)	Below 1/9
Cesium-137 :	9	(H25/10/17)	→	ND(0.25)	Below 1/30
Total β	: 74	(H25/8/19)	→	ND(14)	Below 1/5
Toritium	: 67	(H25/8/19)	→	ND(1.9)	Below 1/30

Cesium-134 :	3.5	(H25/10/17)	→	ND(0.30)	Below 1/10
Cesium-137 :	7.8	(H25/10/17)	→	ND(0.35)	Below 1/20
Total β	: 79	(H25/8/19)	→	ND(14)	Below 1/5
Toritium	: 60	(H25/8/19)	→	ND(1.9)	Below 1/30

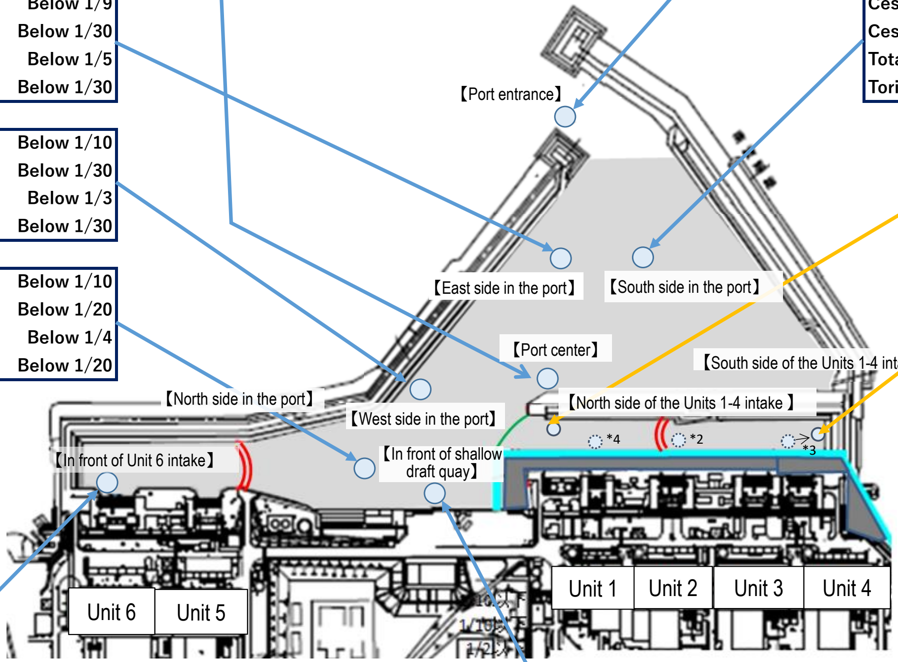
Cesium-134 :	4.4	(H25/12/24)	→	ND(0.34)	Below 1/10
Cesium-137 :	10	(H25/12/24)	→	ND(0.30)	Below 1/30
Total β	: 60	(H25/7/4)	→	16	Below 1/3
Toritium	: 59	(H25/8/19)	→	ND(1.9)	Below 1/30

Cesium-134 :	32	(H25/10/11)	→	ND(0.33)	Below 1/90
Cesium-137 :	73	(H25/10/11)	→	1.5	Below 1/40
Total β	: 320	(H25/8/12)	→	ND(11)	Below 1/20
Toritium	: 510	(H25/9/2)	→	3.8	Below 1/100

Cesium-134 :	5	(H25/12/2)	→	ND(0.35)	Below 1/10
Cesium-137 :	8.4	(H25/12/2)	→	ND(0.32)	Below 1/20
Total β	: 69	(H25/8/19)	→	ND(14)	Below 1/4
Toritium	: 52	(H25/8/19)	→	ND(1.9)	Below 1/20

Cesium-134	ND(0.37)
Cesium-137	3.0
Total β	17
Toritium	29

*1



Sea side impermeable wall
Silt fence
Silt fence for construction

*1: Monitoring commenced in or after March 2014. Monitoring inside the sea-side impermeable walls was finished because of the landfill.
*2: For the point, monitoring was finished from December 12, 2018 due to preparatory work for transfer of mega float.
*3: For the point, monitoring point was moved from February 6, 2019 due to preparatory work for transfer of mega float. The point was further moved to the outside of the silt fence from January 20, 2023, to install the silt fence to the Drainage Channel K outlet as a measure for fish in the port. (The sampling point was moved to approx.. 3m east side)
*4: For the point, monitoring was finished from April 3, 2019 due to preparatory work for transfer of mega float.

	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

Cesium-134 :	2.8	(H25/12/2)	→	ND(0.36)	Below 1/7
Cesium-137 :	5.8	(H25/12/2)	→	ND(0.37)	Below 1/10
Total β	: 46	(H25/8/19)	→	ND(11)	Below 1/4
Toritium	: 24	(H25/8/19)	→	ND(2.5)	Below 1/9

Cesium-134 :	5.3	(H25/8/5)	→	ND(0.33)	Below 1/10
Cesium-137 :	8.6	(H25/8/5)	→	ND(0.31)	Below 1/20
Total β	: 40	(H25/7/3)	→	14	Below 1/2
Toritium	: 340	(H25/6/26)	→	ND(1.9)	Below 1/100

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

	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

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 April 10-24)

Summary of TEPCO data as of April 25, 2023

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

Cesium-134 :	ND	(H25)	→	ND(0.37)
Cesium-137 :	ND	(H25)	→	ND(0.30)
Total β :	ND	(H25)	→	ND(13)
Toritium :	ND	(H25)	→	–

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

Cesium-134 :	ND	(H25)	→	ND(0.31)	
Cesium-137 :	1.6	(H25/10/18)	→	ND(0.37)	Below 1/2
Total β :	ND	(H25)	→	ND(13)	
Toritium :	6.4	(H25/10/18)	→	–	

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

Cesium-134 :	ND	(H25)	→	ND(0.21)
Cesium-137 :	ND	(H25)	→	ND(0.26)
Total β :	ND	(H25)	→	ND(13)
Toritium :	ND	(H25)	→	–

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

Cesium-134 :	ND	(H25)	→	ND(0.40)
Cesium-137 :	ND	(H25)	→	ND(0.25)
Total β :	ND	(H25)	→	13
Toritium :	4.7	(H25/8/18)	→	–

【Port entrance】

Cesium-134 :	3.3	(H25/12/24)	→	ND(0.34)	Below 1/9
Cesium-137 :	7.3	(H25/10/11)	→	ND(0.29)	Below 1/20
Total β :	69	(H25/8/19)	→	13	Below 1/5
Toritium :	68	(H25/8/19)	→	0.67	Below 1/100

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

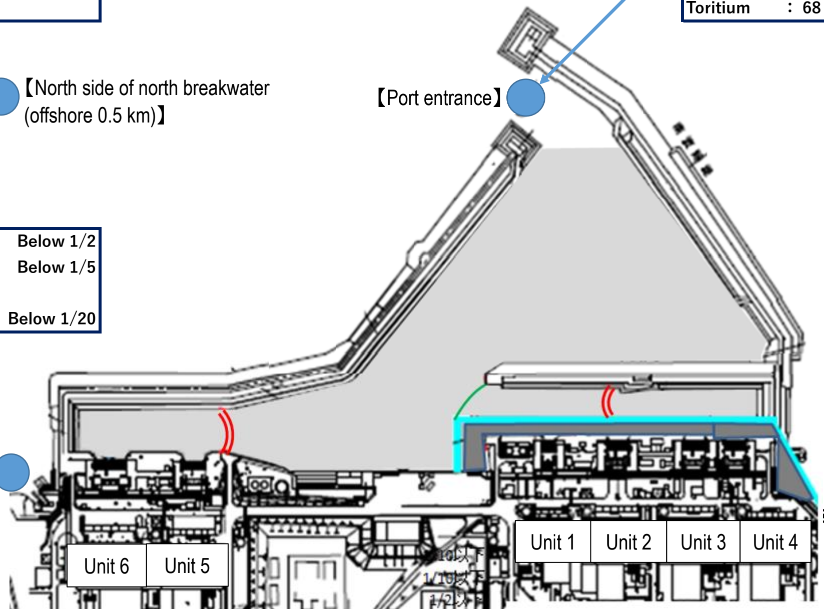
Cesium-134 :	ND	(H25)	→	ND(0.33)
Cesium-137 :	ND	(H25)	→	ND(0.24)
Total β :	ND	(H25)	→	14
Toritium :	ND	(H25)	→	–

【North side of Unit 5 and 6 release outlet】

Cesium-134 :	1.8	(H25/6/21)	→	ND(0.74)	Below 1/2
Cesium-137 :	4.5	(H25/3/17)	→	ND(0.83)	Below 1/5
Total β :	12	(H25/12/23)	→	12	
Toritium :	8.6	(H25/6/26)	→	0.33	Below 1/20

【Near south release outlet (*)】

Cesium-134 :	ND	(H25)	→	ND(0.74)	
Cesium-137 :	3	(H25/7/15)	→	ND(0.54)	Below 1/5
Total β :	15	(H25/12/23)	→	12	
Toritium :	1.9	(H25/11/25)	→	ND(0.33)	Below 1/2



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.

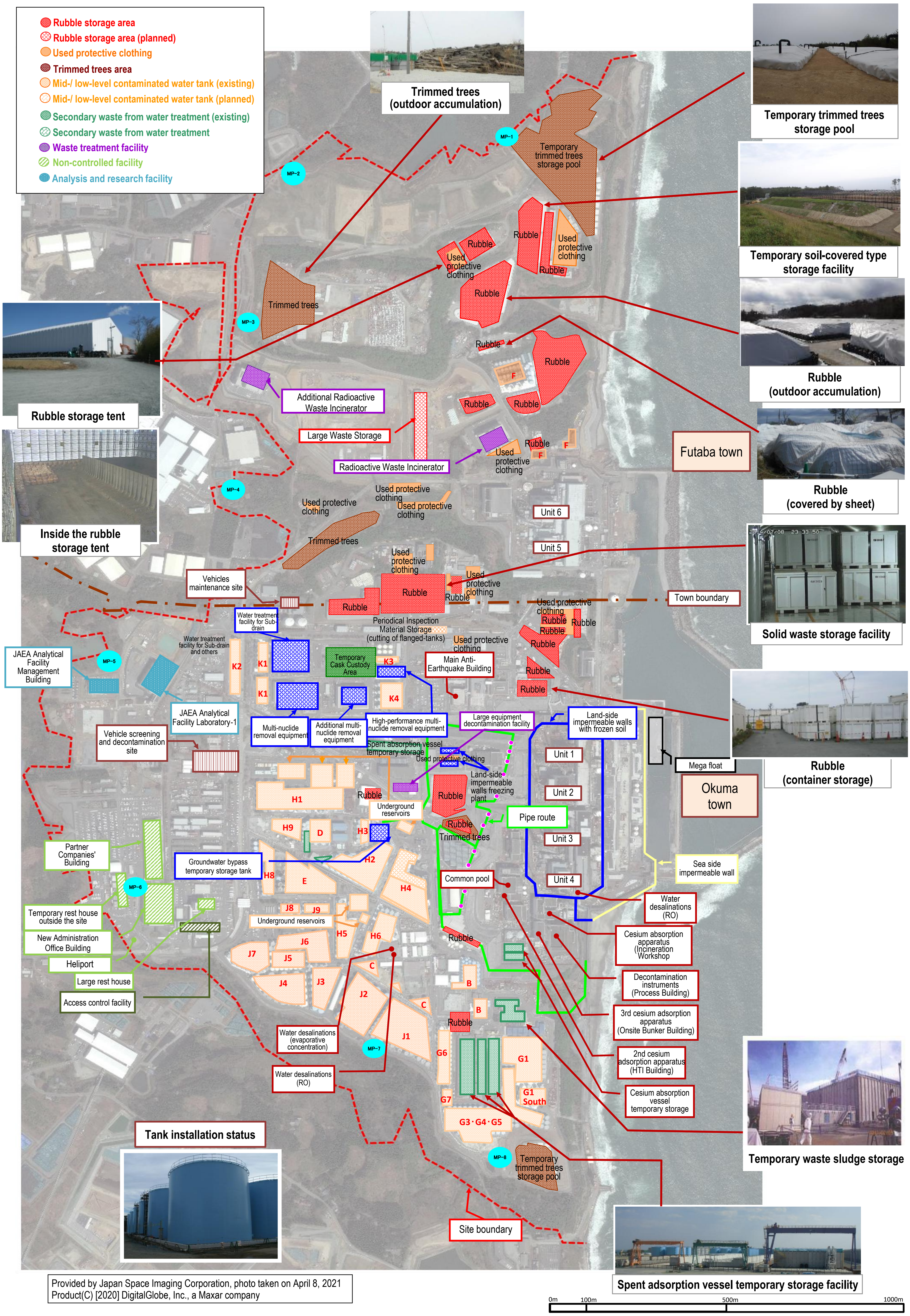
Note: Because safety of the sampling points was unassured due to the influence of Typhoon No. 10 in 2016, samples were taken from approx. 330 m south of the Unit 1-4 release outlet. Samples were also taken from a point approx. 280m south from the same release outlet from January 27, 2017 and approx.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

Appendix 2

April 27, 2023

TEPCO Holdings Fukushima Daiichi Nuclear Power Station Site Layout



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 m^3/day or less (within 2020)
- Suppressing the amount of contaminated water generated to 100 m^3/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.
- [Completed] 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 | 2024

Contaminated water management 【Remove】

Contaminated water treatment facility

▽Reception start of contaminated water to Central Waste Treatment Building
▽Decontamination equipment (AREVA)
▽Evaporative concentration equipment
▽Cesium Adsorption Apparatus (KURION)
▽2nd Cesium Adsorption Apparatus (SARRY)
▽Treatment of RO-condensed salt water complete
▽Purification of strontium-reduced water in flanged tanks complete
▽Purification of strontium-reduced 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)
▽Reduction of strontium by 3rd Cesium Adsorption Apparatus (SARRY II) (from 2019.7.12)
▽Treatment start of strontium-reduced water (ALPS: from 2015.12.4, additional: from 2015.5.27, high-performance: from 2015.4.15)
▽Multi-nuclide Removal Equipment (ALPS) (System A: from 2013.3.30, System B: from 2013.6.13, System C: from 2013.9.27, hot tests conducted)
▽Multi-nuclide Removal Equipment (additional ALPS)
▽Start of full-scale operation (from 2017.10.16)
▽Multi-nuclide Removal Equipment (high performance ALPS) (from 2014.10.18, hot tests conducted)
▽Pre-service inspection granted (2023.3.2)


Cesium Adsorption Apparatus (KURION)

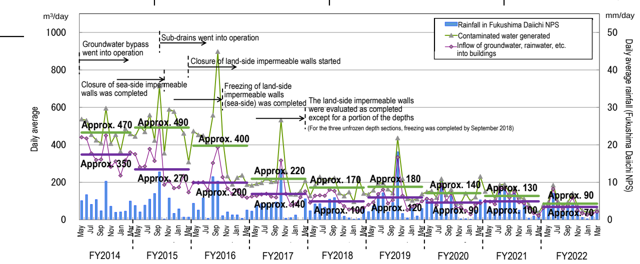

Landing of the second Cesium Adsorption Apparatus (SARRY)


Multi-nuclide removal equipment (ALPS)

Removal of contaminated water from seawater pipe trench

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


Unit 2 seawater pipe trench Shaft D filling work



Suppressing the average amount of contaminated water generated to approx. 90 m3/day ▽

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 m^3/day)
▽Enhancement of treatment capacity
(2000m^3/day)


Sub-drain purification system

Land-side impermeable wall

▽Installation start of land-side impermeable walls
▽Freezing start
▽Start of maintenance operation on north and south sides
Start of maintenance operation on east side▽
▽Freezing completion
▽Start of maintenance operation in all sections
▽Freezing completion (except for some parts)
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


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

▽Storage in steel square tanks
▽Completion of purification treatment of RO concentrated salt water
▽Completion of replacement of steel square tanks
...pt for condensed waste liquid
▽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)


Flanged and welded-joint tanks


Construction of welded-joint tanks

Treatment of stagnant water

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

Countermeasures to tsunami

Closure of openings

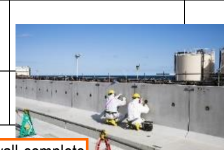
▽Examination start of measures to close building openings
▽Work for common pool complete
▽Work for Units 1 and 2 T/B complete
▽Work for HTI building complete
▽Work for Process Main Building complete
▽Work for Unit 3 T/B complete
▽Work for Unit 1-3 R/B complete
▽Measures to close openings were completed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

Seawall

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

Mega float

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


Chishima Trench Tsunami Seawall complete


Construction of Japan Trench Tsunami Seawall

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.

Information provision and communication to foster understanding

- 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.

● **Visits and Discussion Meetings of Fukushima Daiichi Nuclear Power Station**
To solve people's questions, TEPCO invites their visits to the power station and answer their questions on site. From people who participated in the visit gave feedbacks such as "by directly seeing the decommission site and having dialogues, they could obtain deeper understanding about the present situation, issues and status of safety measures."
TEPCO will continue these efforts to invite more people including online visits.
<Visits in FY2022: 15 times, 142 participants in total>

● For overseas, the was renewed. **"Treated Water portal site in English, Chinese and Korean"**
- "Sea Area Monitoring" page in English, Chinese and Korean was published
- "The 1st IAEA Review" explanation booklet was published in English, Chinese and Korean

● When inaccurate or misleading overseas information was detected, for maximum suppression of reputation, return call or other actions will be taken.
● A condition to deliver science-based information to overseas media and embassies in Japan will be created.
- Approach to major media and embassies is being enhanced.
- For accurate media coverage, regular press conferences will continue to be held.

● **Safety review of International Atomic Energy IAgency (IAEA)**
In November 2022, IAEA review team visited Japan to conduct the second review concerning safety of ALPS treated water (the first review was conducted in February 2022 and the report was published in April)
- The article of the IAEA Review concerning handling of ALPS treated water and overview of the report are published timely on the TEPCO website.
- Instructions from IAEA were reflected in the revision of the implementation plan and the radiation assessment report.
- The report of the second review will be published around early 2023.


IAEA review team arrived at the Fukushima Daiichi Nuclear Power Station

● 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.

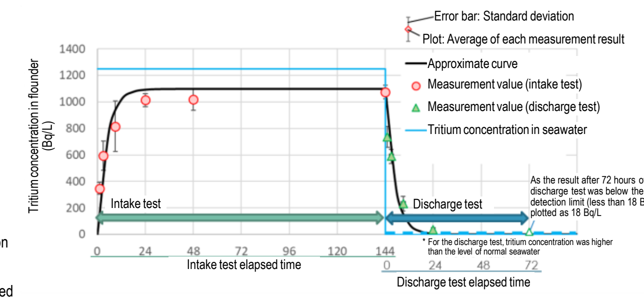

Flounder in rearing preparation tank


Overall view of mockup tanks

● **Measurement of tritium concentration of flounder (tritium concentration less than 1,500 Bq/L) and analysis of results**
Based on the measurement results of tritium concentration, the following was confirmed as in the past insight:

[Intake test]
- The tritium concentration did not exceed the level in the growing environment (in this test, the concentration exceeding the level in ALPS treated water diluted with seawater)
- The tritium concentration reached equilibrium in a certain period

[Discharge test]
- When flounder having reached equilibrium in the tritium concentration higher than the level of normal seawater is returned to normal seawater, the concentration decreased over time



- Daily rearing status is published in the TEPCO website and Twitter
  - TEPCO website: http://www.tepco.co.jp/decommission/information/newsrelease/breedingtest/index-j.html
  - TEPCO Twitter: https://twitter.com/TEPCOfishkeeper

Examination concerning handling of ALPS treated water

Tritiated Water Taskforce (2013.12 – 2016.5, 15 meetings)


Tank area viewed from the Large Rest House (2015.10.29)

2016.6 Report of Tritiated Water Taskforce

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

2018.8 Explanatory and hearing meeting, receiving opinions

2020.2 Report of Subcommittee on Handling of ALPS treated water

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

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

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

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

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

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

2022.8.4 Work has commenced

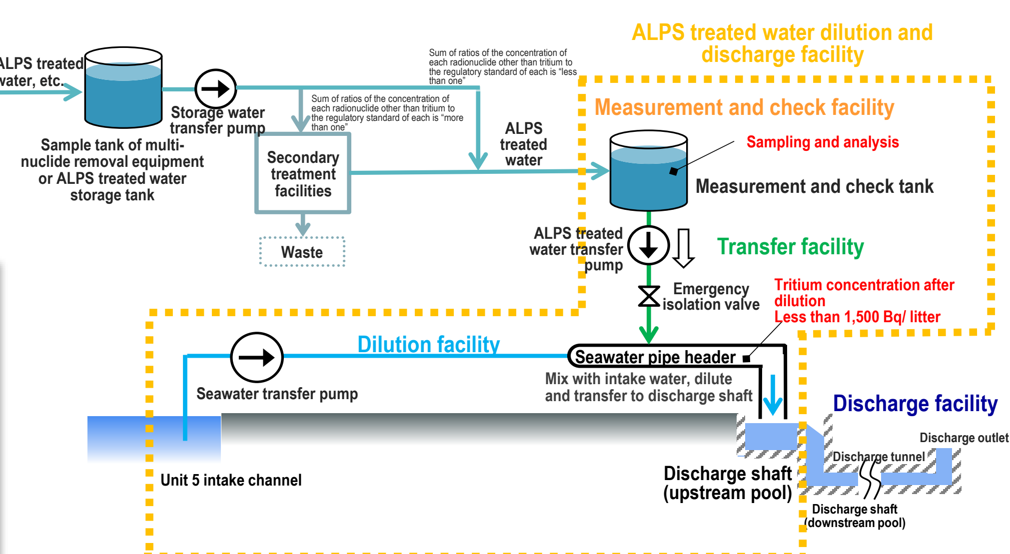
2022/8/30 The "Approach to Strengthening and Expansion of Measures in the Handling of ALPS Treated Water" was summarized

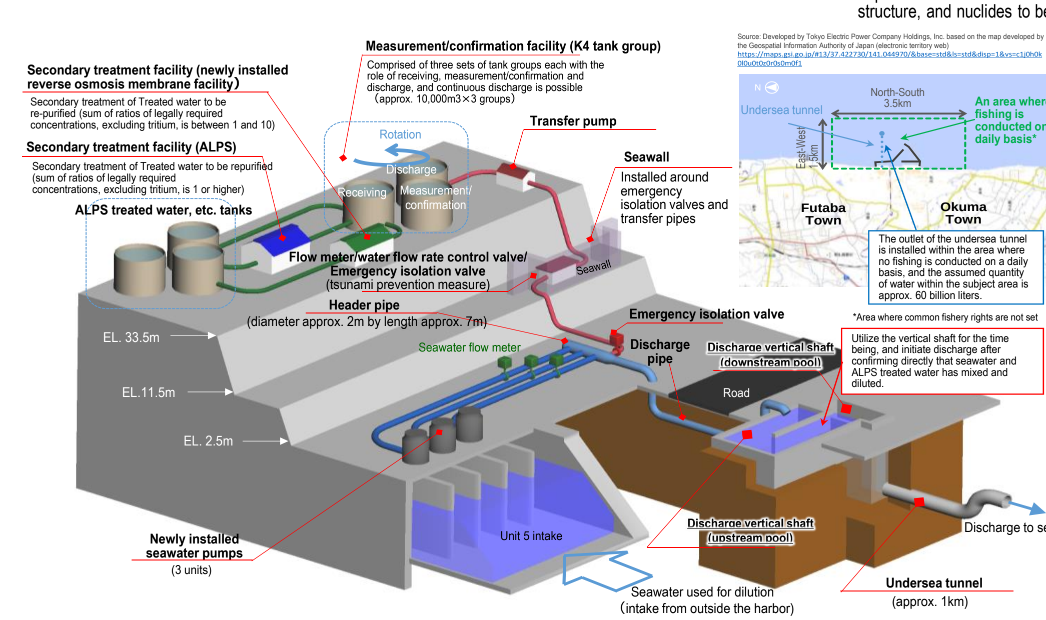
2022.11.14
Application for the Application Documents for Approval to Amend the Implementation Plan was submitted (amendment of organizational structure, and nuclides to be measured and assessed, and others)

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

2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

【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)

April 27, 2023
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

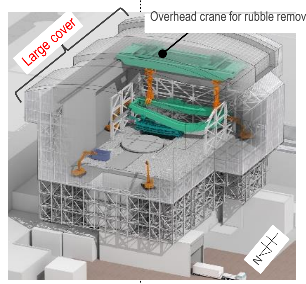
Legend: Rubble removal, etc. → Installing a fuel removal machine → Fuel removal → Storage and handling of fuel

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

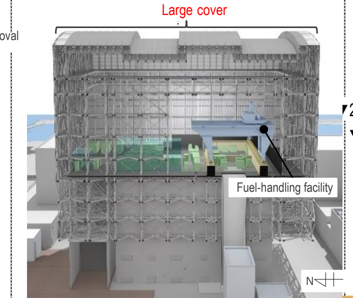
Unit 1

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

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



Rubble removal (image)



Fuel removal (image)

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.

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

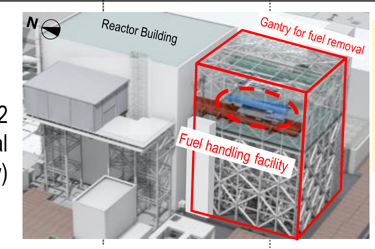

<Unit 1 northwest side 2023.2.9>

Unit 2

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

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

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



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 Reactor Building, the decision was made to install a small opening on the south side and use a boom crane. Examination continues to initiate fuel removal from FY2024 to FY2026.

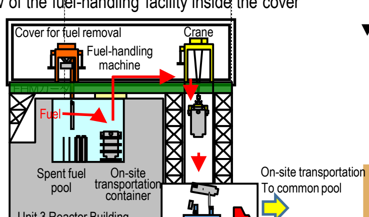
- ▼2015.3-2016.11 Yard construction
- ▼2016.9-2017.4 West-side gantry installation work
- ▼2017.5 Opening a hole in the west-side external wall
- ▼2018.8-2020.12 Moving and containment of remaining objects
- ▼2020.6 Investigation inside the spent fuel pool
- ▼2020.6 Investigation inside the spent fuel pool
- ▼2023.1 Start of steel erection
- ▼2023.2 Start of south-side existing facilities dismantling


<Unit 2 Construction of gantry for fuel removal>

Unit 3

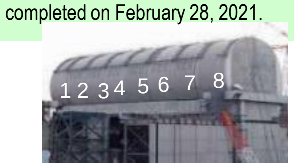
All fuel assemblies from Unit 3 had been removed by February 2021.

Overview of the fuel-handling facility inside the cover



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

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



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

Unit 4

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

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


<Unit 4 Cover for fuel removal>

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


Fuel removal

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

4 Work toward fuel debris retrieval

April 27, 2023
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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

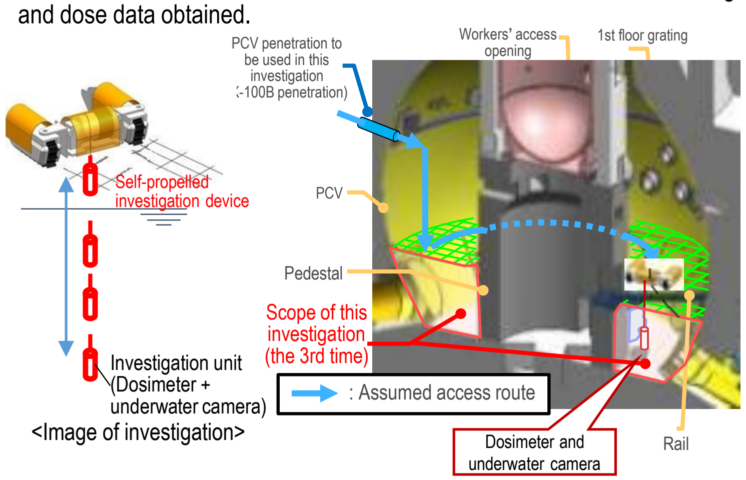
Start of fuel debris retrieval from the first unit (Unit 2). Expanding the scale in stages (within 2021 * The schedule will be extended for about 1 year due to the spread of COVID-19 infections)

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

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

Unit 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	- Acquiring images - Measuring the air temperature and dose rate - Measuring the water level and temperature - Sampling stagnant water - Installing permanent monitoring instrumentation
	2nd (2015.4)	Confirming the status of the PCV 1st floor - Acquiring images - Measuring the air temperature and dose rate - Replacing permanent monitoring instrumentation
	3rd (2017.3)	Confirming the status of the PCV 1st basement floor - Acquiring images - Measuring the dose rate - Sampling deposit - Replacing permanent monitoring instrumentation
	4th (From 2022.2)	Acquiring information inside PCV (inside/outside of the pedestal) - Acquiring images - Measuring deposit thickness and sampling deposit - Detecting deposit debris, 3D mapping
Leakage points from PCV	- PCV vent pipe vacuum break line bellows (identified in 2014.5) - Sand cushion drain line (identified in 2013.11)	
Evaluation of the location of fuel debris inside the reactor by measurement using muons Confirmed that there was no large fuel in the reactor core. (2015.2-5)		

Unit 2 Investigation overview

・In January 2017, a camera was inserted from the PCV penetration to inspect the conditions of the rail on which the robot traveled. The results of a series of investigations confirmed some gratings had fallen and deformed as well as a quantity of deposit inside the pedestal.

・In January 2018, the conditions below the platform inside the pedestal were investigated. Based on the analytical results of images obtained in the investigation, deposits, probably including fuel debris, were found at the bottom of the pedestal. Moreover, multiple parts exceeding the surrounding deposits were also detected. We presumed that there were multiple instances of fuel debris falling.

・In February 2019, an investigation touching the deposits at the bottom of the pedestal and on the platform was conducted and confirmed that the pebble-shaped deposits, etc. could be moved and that hard rock-like deposits that could not be gripped may exist.

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

・In October 2020, 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 2 PCV internal investigation

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

Unit 3 Investigation overview

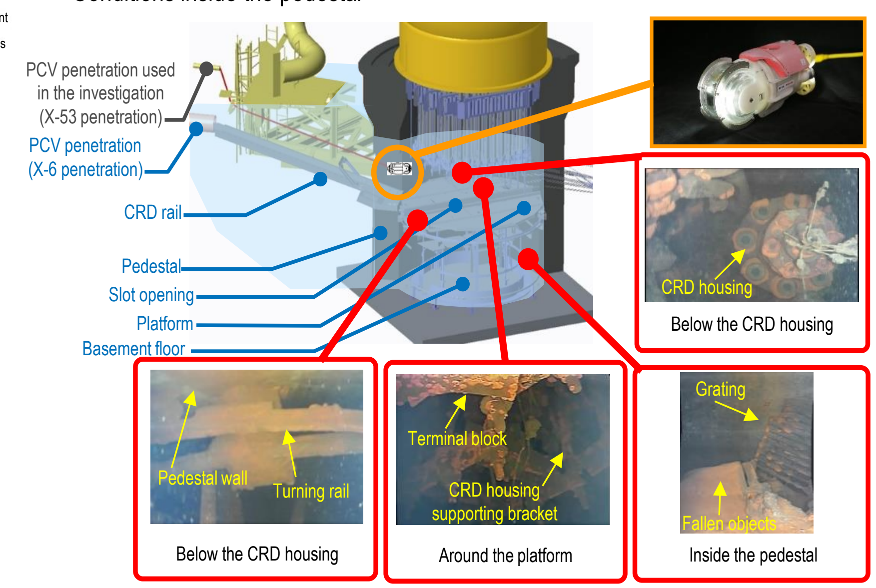
・In October 2014, the conditions of X-53 penetration, which may be under water and which is scheduled for use to investigate the inside of the PCV, was investigated via remote-controlled ultrasonic test equipment. The results showed that the penetration was not under water.

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

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

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

<Conditions inside the pedestal>



Unit 3 PCV internal investigation

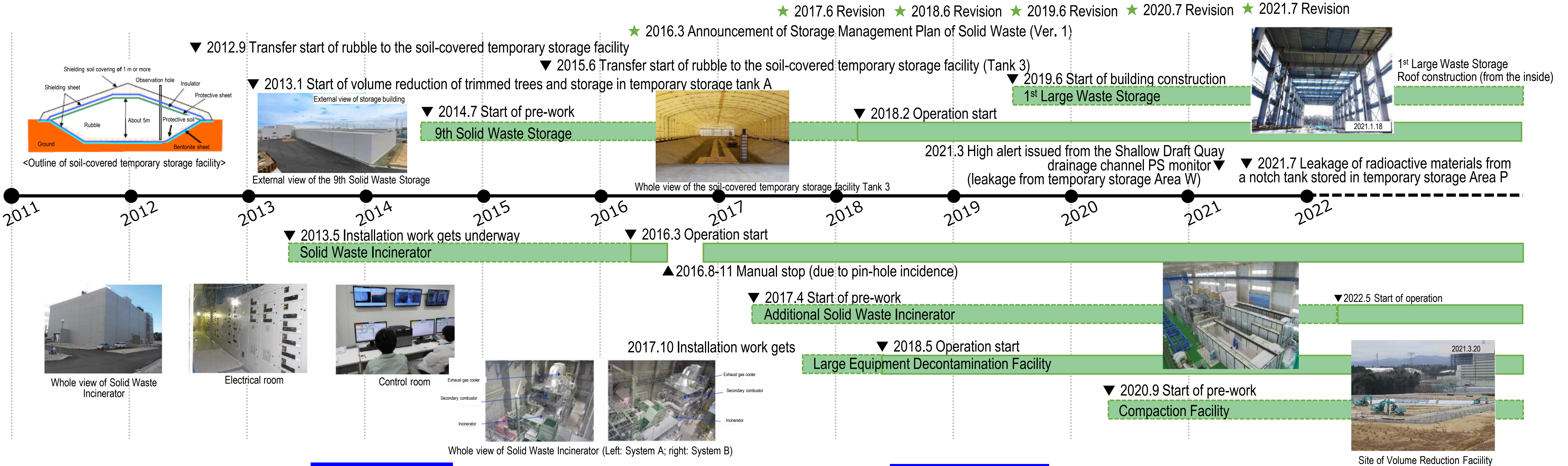
Investigations inside the PCV	1st (2015.10-12)	- Acquiring images - Measuring the air temperature and dose rate - Measuring the water level and temperature - Sampling stagnant water - Installing permanent monitoring instrumentation (2015.12)
	2nd (2017.7)	- Acquiring images - Installing permanent monitoring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

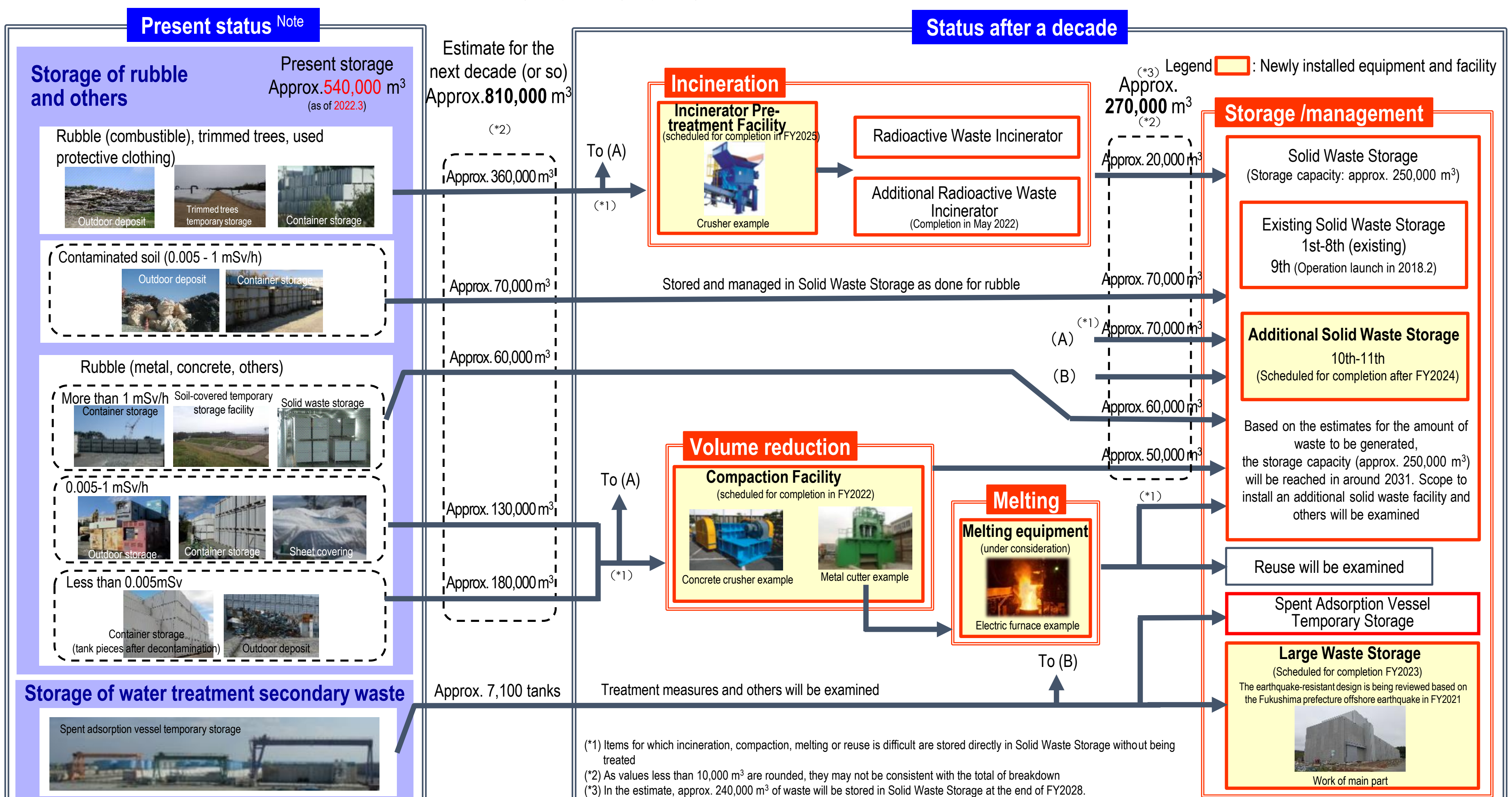
Images are provided by the International Research Institute for Nuclear Decommissioning (IRID)

April 27, 2023
Secretariat of the Team for Countermeasures for Decommissioning, Contaminated Water and Treated Water

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)





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

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

6 Improvement of work environment

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

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

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

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

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

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


External view of Access Control Facility

▼ 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.


Large rest house under construction
(2014.9.30)

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

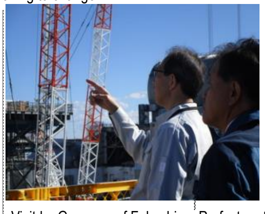
▼ A large rest house for workers was established and its operation commenced in May 2015.
Spaces in the large rest house are also installed for office work and collective worker safety checks as well as taking rest.
In March 2016, a convenience store opened in the large rest house. In April, the shower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

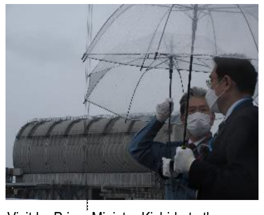

Access Control Facility
(2014.11.7)

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

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

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

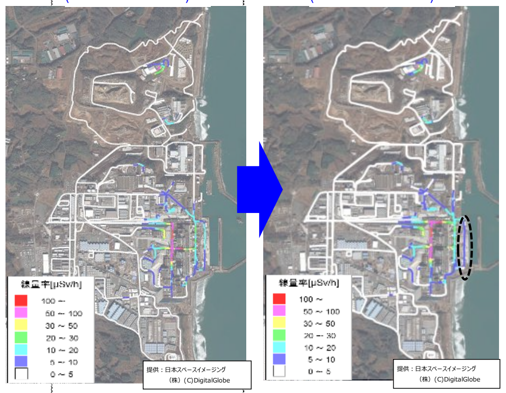

Visit by Governor of Fukushima Prefecture to the Fukushima Daiichi NPS (2018.11.1)


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

<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.

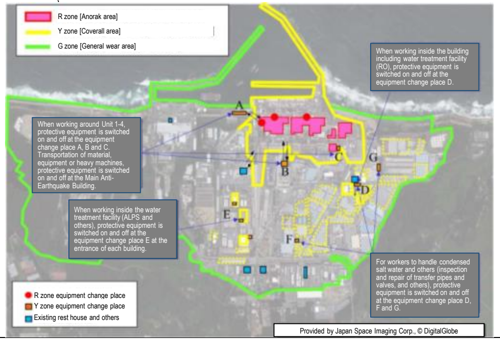
FY2020 4th Quarter (measured in 2021.3) | FY2021 4th Quarter (measured in 2022.2)



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

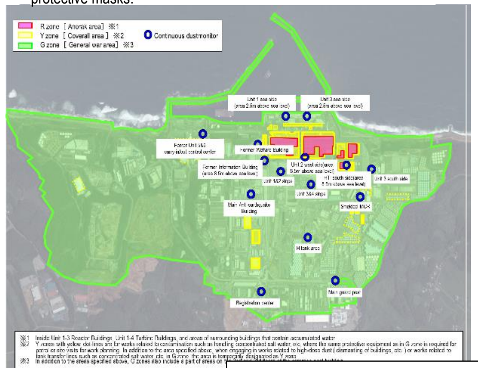
▼ In May 2015, full-face mask unnecessary area was expanded to cover about 90% of the site.

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



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

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



Provided by Japan Space Imaging Corp., © DigitalGlobe

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


Move in general working clothes
(2016.1.7)


Facing
(2017.4.13)