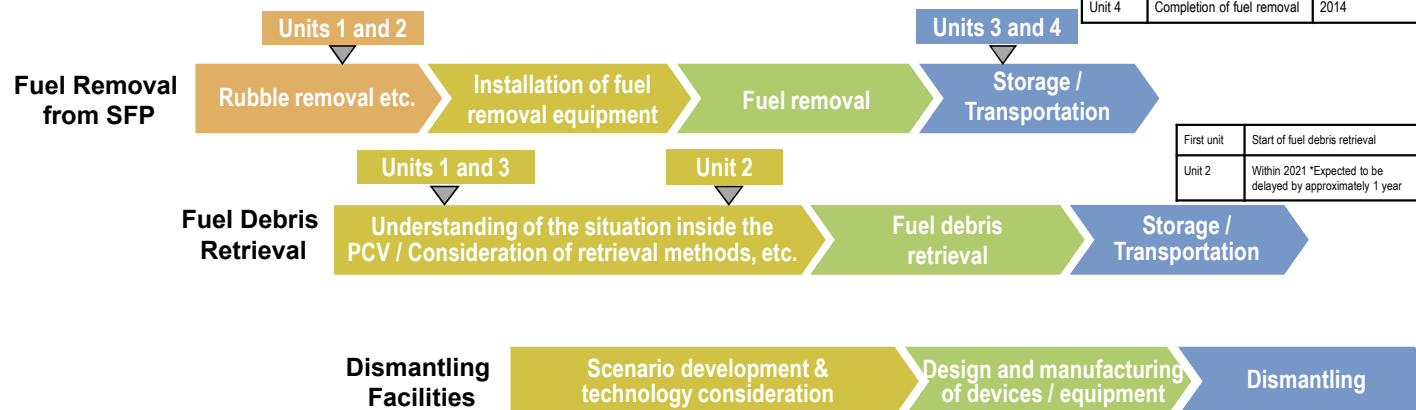


Main decommissioning work and steps

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.

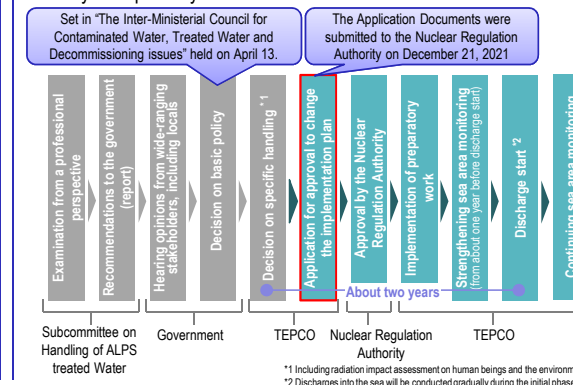
Units 1-6	Completion of fuel removal	Within 2031
Unit 1	Start of fuel removal	FY2027 - FY2028
Unit 2	Start of fuel removal	FY2024 - FY2026
Unit 3	Completion of fuel removal	Within FY2020
Unit 4	Completion of fuel removal	2014



Measures of 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 continuously and fully transparently.



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

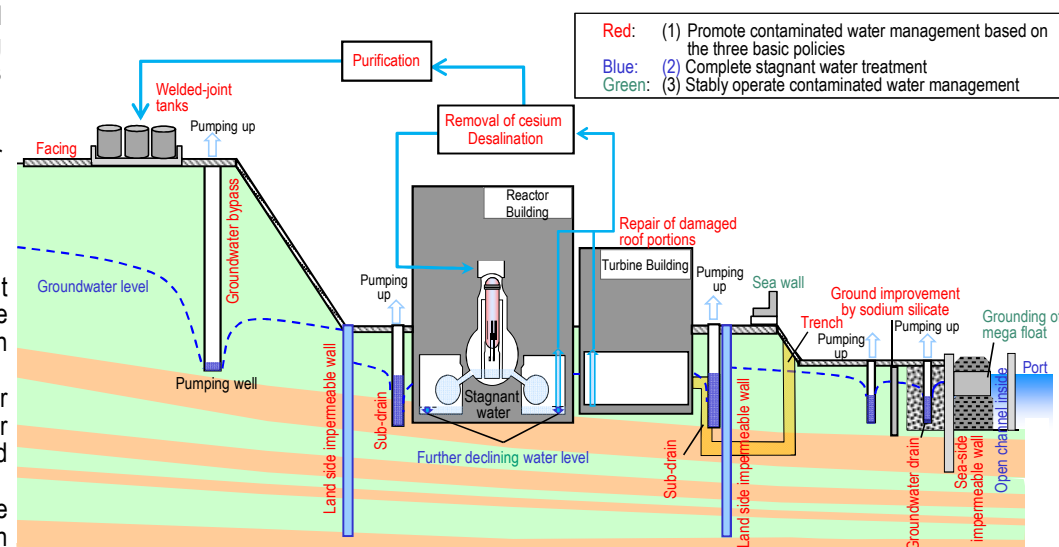
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal equipment) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and sub-drains, have stabilized 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 m³/day (in May 2014) to approx. 180 m³/day (in FY2019) and approx. 140 m³/day (in 2020).
- Measures continue to further suppress the generation of contaminated water to 100 m³/day or less within 2025.

(2) Efforts to complete stagnant water treatment

- To reduce the stagnant water levels in buildings as planned, work to install additional stagnant water transfer equipment is underway. At present, the floor surface exposure condition can be maintained except for the Unit 1-3 Reactor Buildings, Process Main Building and the High Temperature Incinerator Building.
- In 2020, treatment of stagnant water in buildings was completed, except for the Unit 1-3 Reactor Buildings, Process Main Building and High-Temperature Incinerator Building. For Reactor Buildings, the amount of stagnant water there will be reduced to about half the amount at the end of 2020 during the period FY2022-2024.
- For Zeolite sandbags on the basement floors of the Process Main Building and High-Temperature Incinerator Building, measures to reduce the radiation dose are being examined with stabilization in mind.

(3) Efforts to stably operate contaminated water management

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



Progress status

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

State at the Fukushima Daiichi Nuclear Power Station(NPS) after the Earthquake of March 16

On March 16, an earthquake with a hypocenter off the coast of Fukushima Prefecture occurred. As a seismic intensity of 6-weak was observed at the location of the Fukushima Daiichi NPS, the NPS determined that it was an event necessitating alert status and enhanced monitoring status.

Subsequent patrols conducted determined that the equipment troubles having been found would not impact the power station operation. Accordingly, the station returned to normal monitoring status on March 17.

The earthquake had influence on facilities (water-level decline in the Unit 1 Primary Containment Vessel (PCV), cooling of the spent fuel pool stopped, toppled-over containers, tanks moved out of position and others), but there was no leakage of radioactive materials into the environment, fatal accidents, or events possibly affecting future plant operation.

Although values at dust monitors around buildings temporarily rose after the earthquake, no significant fluctuation was observed in monitoring posts or dust monitors near the site boundary, and the values subsequently returned to normal.



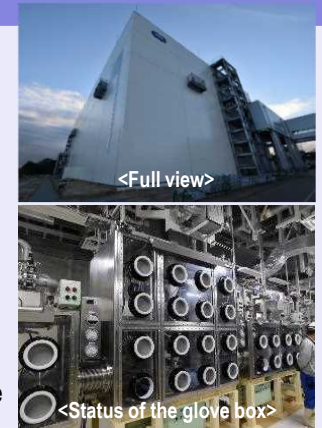
<State of containers>

Construction status of the Radioactive Material Analysis and Research Facility Laboratory-1

At the Radioactive Material Analysis and Research Facility Laboratory-1, third-party analysis for ALPS treated water by the government is planned as well as analysis of waste samples such as rubble.

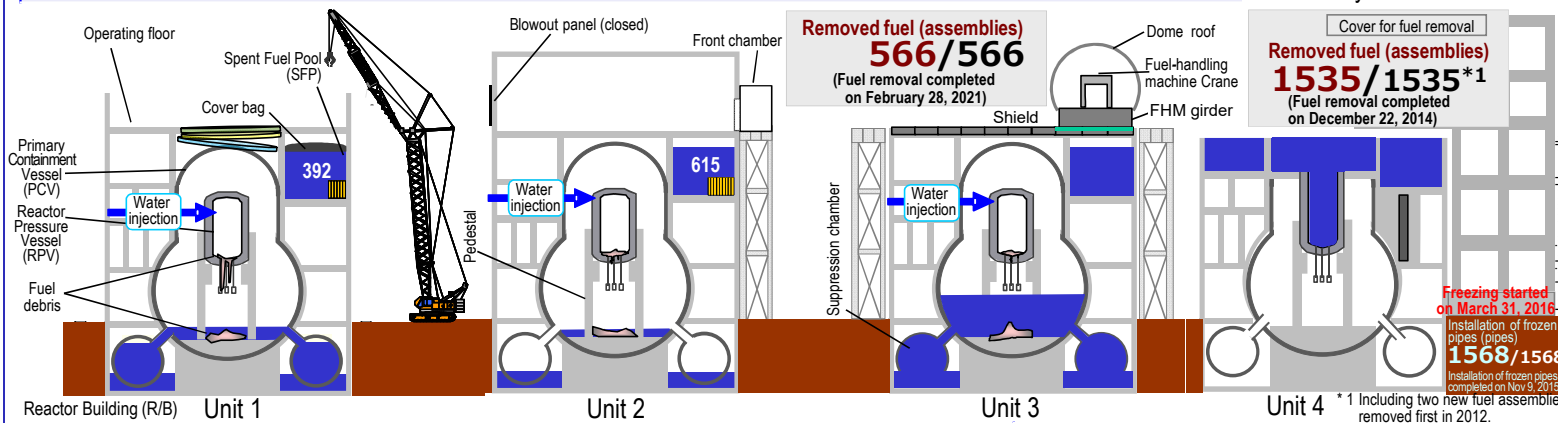
When the air-conditioning equipment was tested in January 2021, insufficient air volume was detected. However, the evaluation confirmed that the present air volume would be able to maintain the safety function such as maintaining negative pressure.

Toward construction completion and operation start at the end of June 2022, applications to change the implementation plan and final adjustment of the air volume for air-conditioning are underway.



<Full view>

<Status of the glove box>



Operation start of the Units 5/6 sub-drain

For the Units 5/6 sub-drain facilities, restoration work had been conducted since September 2020 to suppress the groundwater inflow rate to Units 5/6. Restoration of the Units 5/6 sub-drain pumping-up facilities and installation of facilities to transfer pumped-up groundwater to the existing sub-drain water collection facility were completed in January 2022.

Once the soundness of the facilities was confirmed in the subsequent comprehensive test in February, operation (transfer) started from March 28.

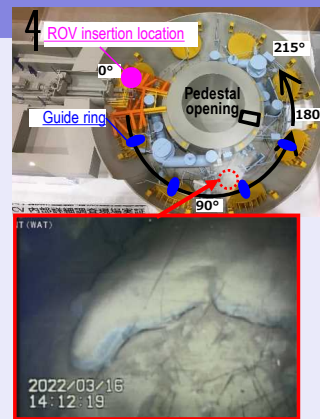
Unit 1 The second submersible vehicle was inserted into the Primary Containment Vessel (PCV)

From March 14, the second submersible vehicle (ROV-A2) was inserted to commence a "detailed visual inspection of the outside perimeter of the pedestal."

This investigation until March 16 newly detected deposits and others. However, as a decline in the PCV water level was confirmed after the earthquake on March 16, the investigation was temporarily suspended.

To obtain the water level necessary for the investigation, the water injection rate into the reactor increased. The increased water level was confirmed but on March 29, the image was inappropriate due to water infiltrating the camera of the submersible ROV-A2.

As part of efforts to resume the investigation, examination is underway, including investigating the cause at the infiltration point and replacing with an alternative device.



<Status of deposit>

Unit 2 The targeted water level decrease was achieved for stagnant water in the Reactor Building

For the Units 1-3 Reactor Building (R/B), the decrease in the R/B stagnant water level in the R/B to approx. half of the end of 2020 within FY2022-2024 is specified as a milestone of the Mid-and-Long-Term Roadmap.

In the Unit 2 R/B, water is being reduced carefully while monitoring parameters such as PCV pressure and dust concentration. In March 2022, the targeted water level decrease, approx. T.P.-2800, was achieved.

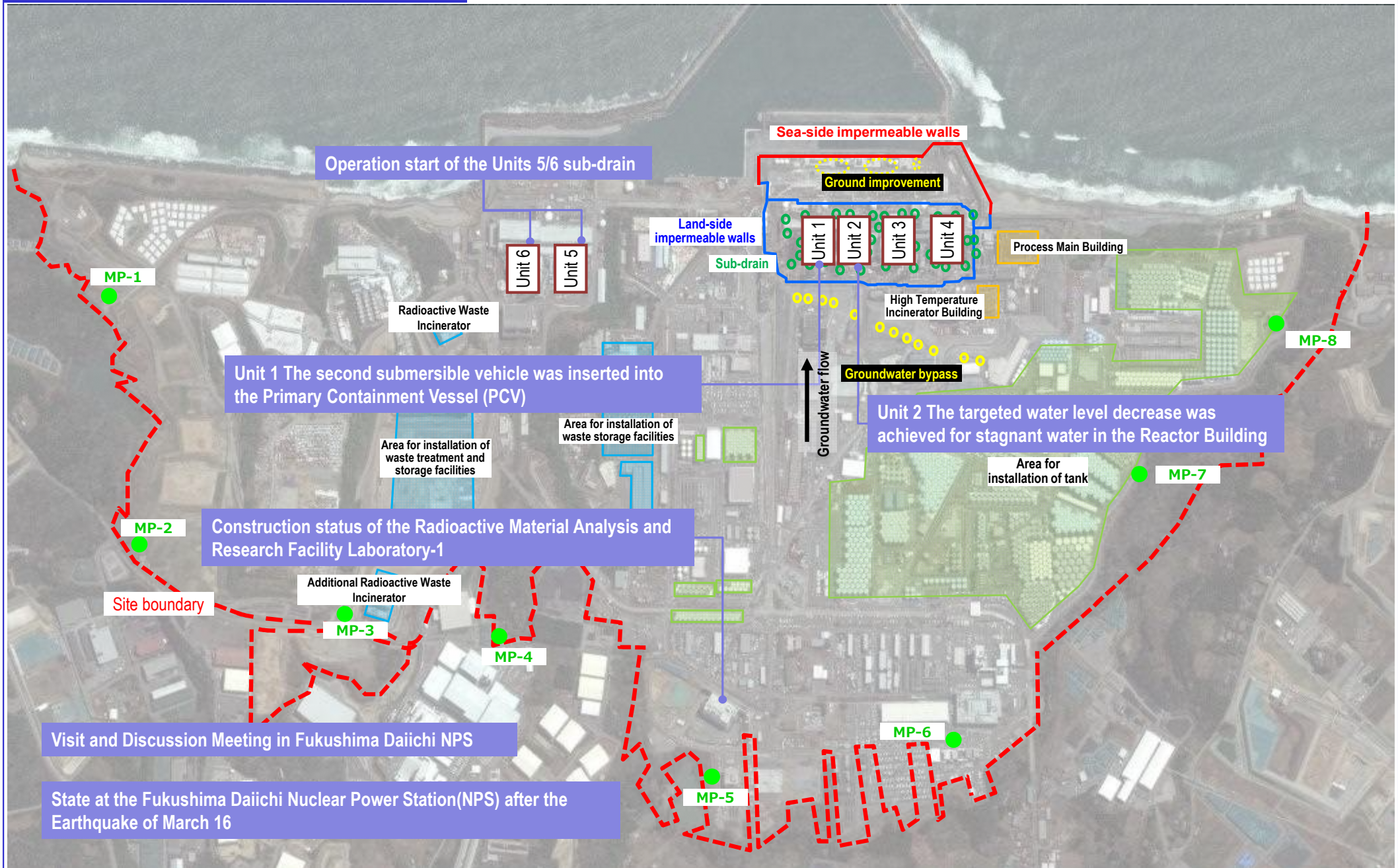
The water level in the Units 1 and 3 R/B will also be decreased on an ongoing basis to achieve the milestone of the Mid-and-Long-Term Roadmap.

Visit and Discussion Meeting in Fukushima Daiichi NPS

To deepen the understanding of residents in Fukushima Prefecture about the current status of decommissioning, contaminated water and treated water management, "Visits and Discussion Meetings of TEPCO's Fukushima Daiichi NPS" will be held more frequently in the next fiscal year.

* Monthly for residents in the following 13 municipalities (Tamura City, Minamisoma City, Kawamata Town, Hirono Town, Naraha Town, Tomioka Town, Kawauchi Village, Okuma Town, Futaba Town, Namie Town, Katsurao Village, Iitate Village, Iwaki City) and five times per year for residents elsewhere in Fukushima Prefecture.

Major initiatives – Locations on site

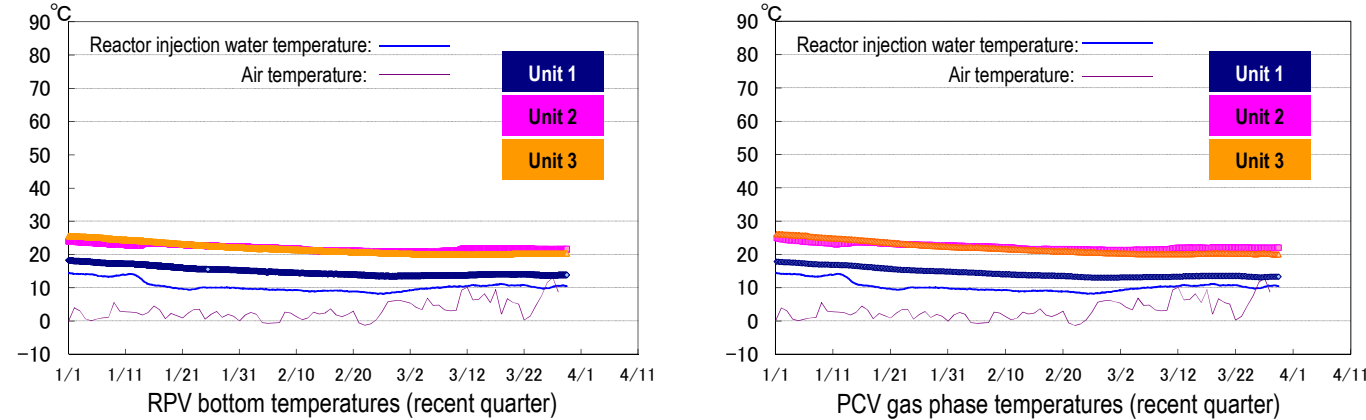


Provided by Japan Space Imaging Corp., photo taken on April 8, 2021
Product (C) [2020] DigitalGlobe, Inc., a Maxar company

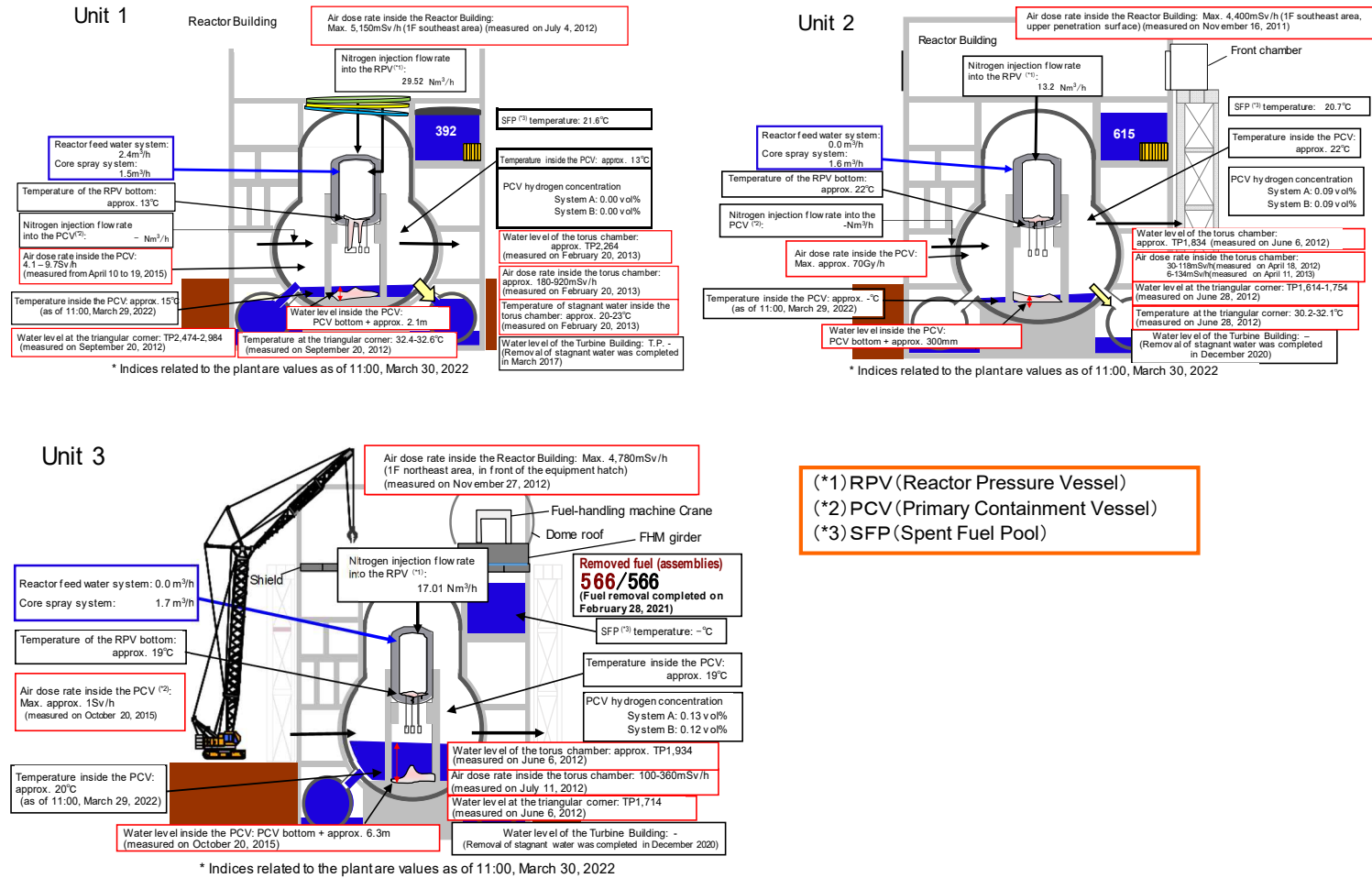
I. Confirmation of the reactor conditions

Temperatures inside the reactors

Through continuous reactor cooling by water injection, the temperatures of the Reactor Pressure Vessel (RPV) bottom and the Primary Containment Vessel (PCV) gas phase were maintained within the range of approx. 15 to 25°C for the past month, though it varied depending on the unit and location of the thermometer.

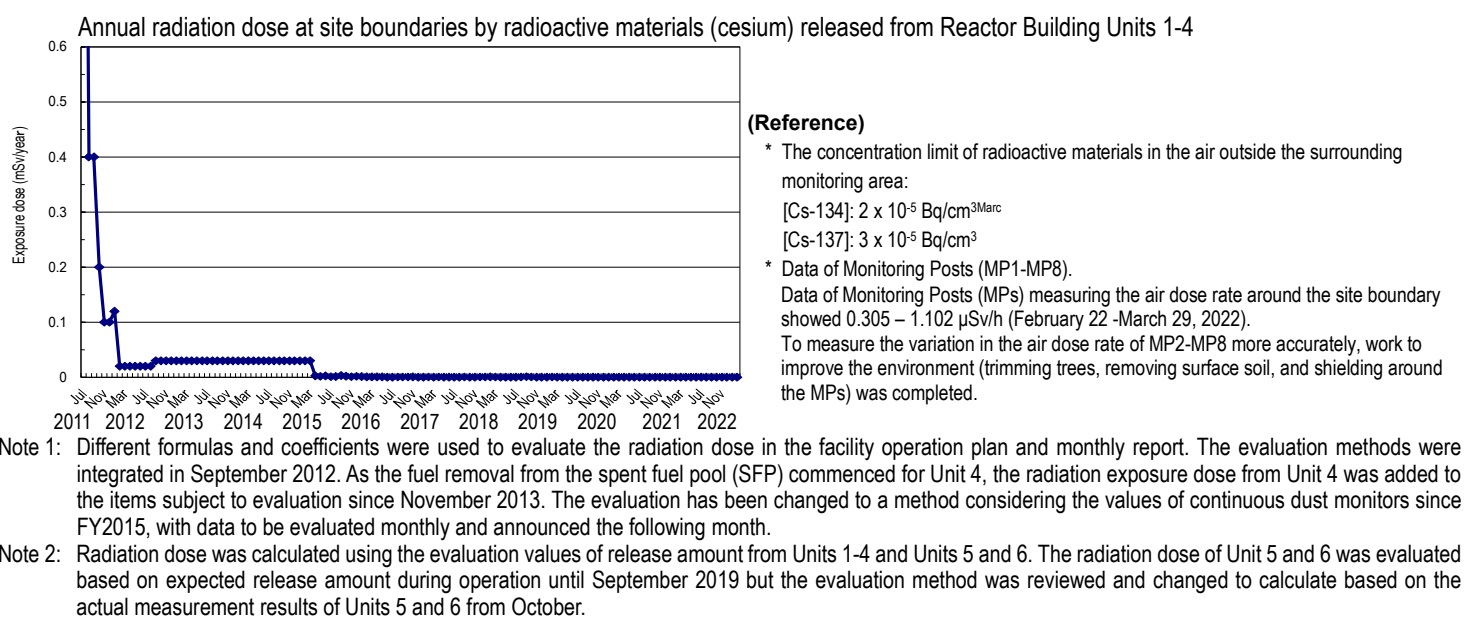


*1 The trend graphs show part of the temperature data measured at multiple points.
*2 A part of data could not be measured due to maintenance and inspection of the facility and other work.



Release of radioactive materials from the Reactor Buildings

As of February 2022, the concentration of radioactive materials newly released from Reactor Building Units 1-4 into the air and measured at the site boundary was evaluated at approx. 1.7×10^{-12} Bq/cm³ and 1.4×10^{-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 0.00003 mSv/year.



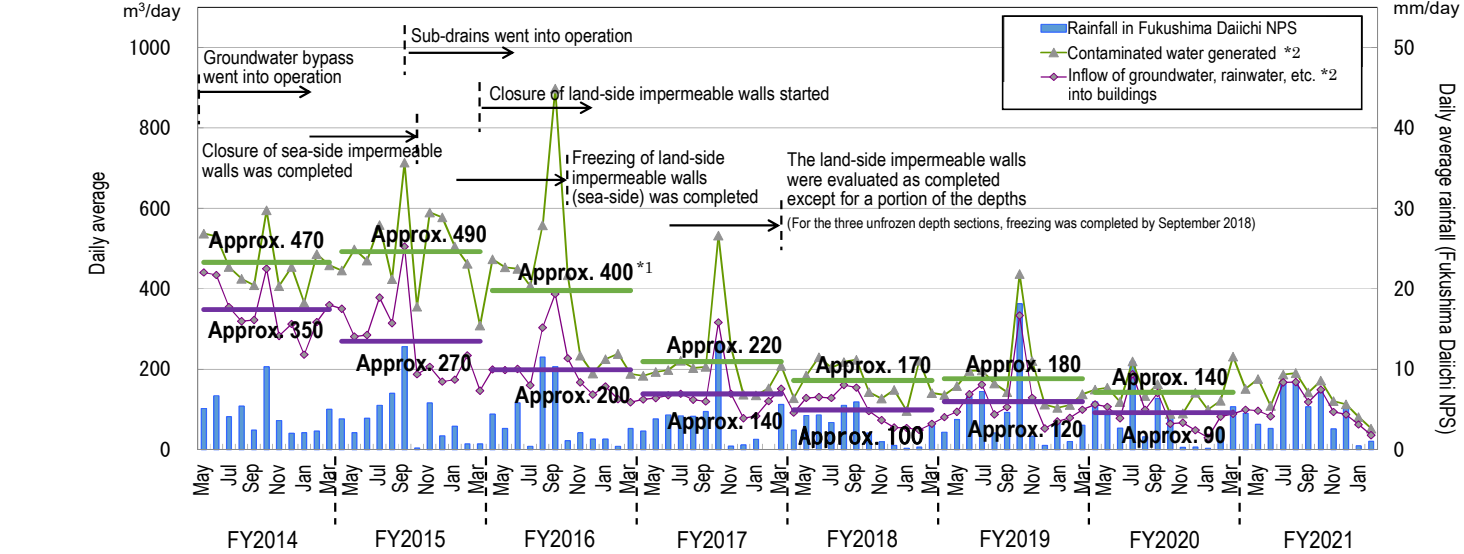
Other indices

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

Progress and others concerning ALPS treated water and others

- Status of contaminated water generated
 - Multi-layered measures, including pumping up by sub-drains and land-side impermeable walls, which were implemented to control the continued generation of contaminated water, suppressed the groundwater inflow into buildings.
 - After implementing “redirecting” measures (groundwater bypass, sub-drains, land-side impermeable walls and others) and rainwater prevention measures, including repairing damaged portions of building roofs, the amount of contaminated water generated within FY2020 declined to approx. 140 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 March 17, 2022, 1,797 releases were conducted.
 - The water quality of all temporary storage tanks satisfied the operation target.

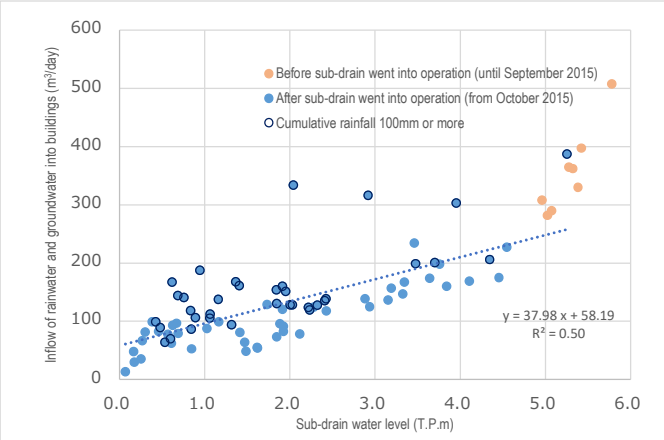
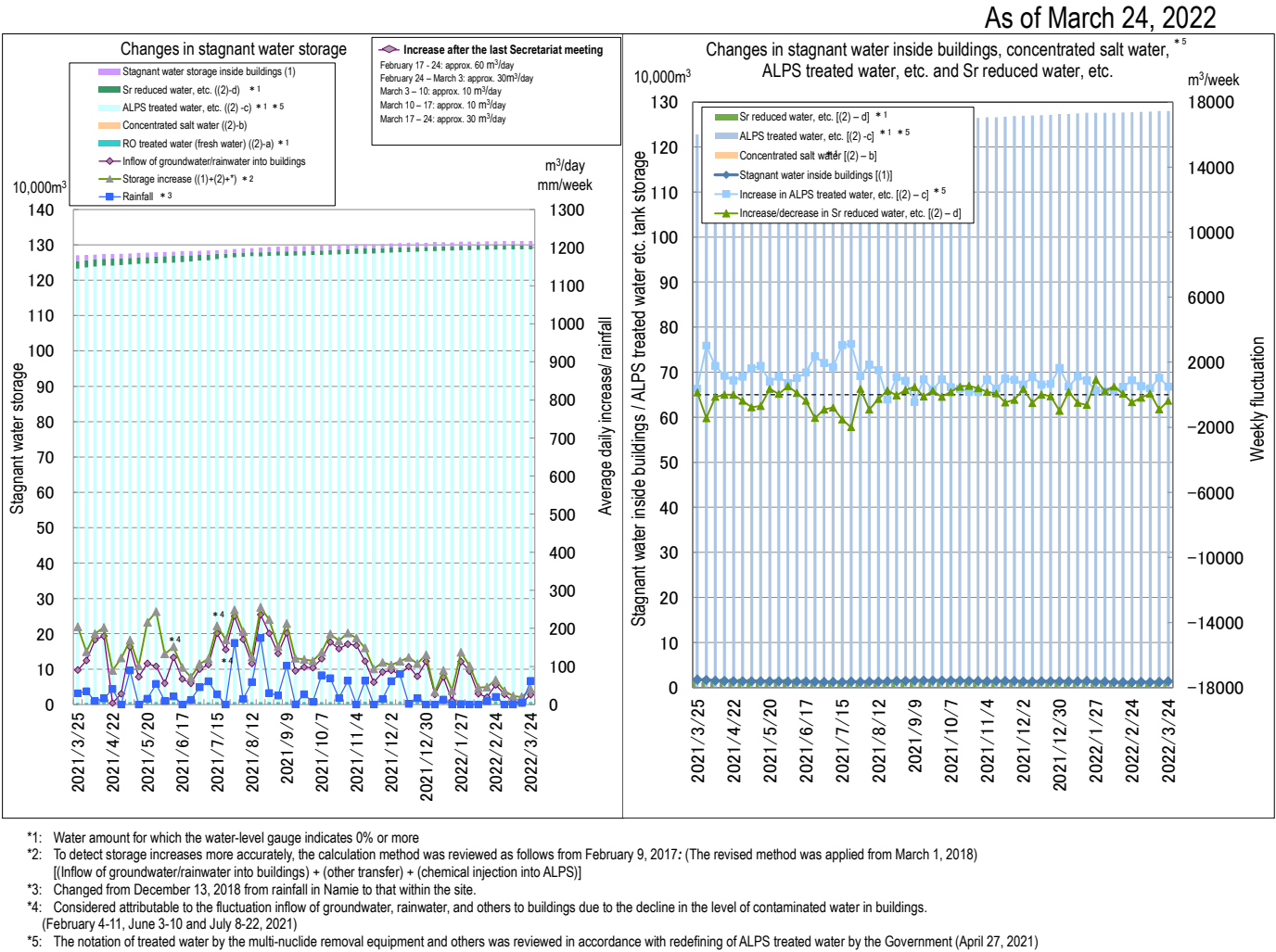


Figure 2: Correlation between inflow such as groundwater and rainwater into buildings and the water level of Units 1-4 sub-drains

- Implementation status of facing
 - Facing is a measure involving asphaltting 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 February 2022, 95% of the planned area (1,450,000 m² on site) had been completed. For the area inside the land-side impermeable walls, implementation proceeds appropriately after constructing a yard from implementable zones that leave the decommissioning work unaffected. As of the end of February 2022, 30% of the planned area (60,000 m²) had been completed.
- Status of the groundwater level around buildings
 - The groundwater level in the area inside the land-side impermeable walls has been declining every year. On the mountain side, however, the difference between inside and outside was maintained, despite varying during rainfall. The water level of the groundwater drain observation well has been maintained at approx. T.P. +1.4 m, sufficiently below the ground surface (T.P. +2.5 m).
- Operation of multi-nuclide removal equipment
 - Regarding the multi-nuclide removal equipment (existing), hot tests using radioactive water are 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 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 are underway (from October 18, 2014).
 - As of March 24, 2022, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 481,000, 730,000 and 103,000 m³, respectively (including approx. 9,500 m³ 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 March 24, 2022, approx. 670,000 m³ had been treated.
- Risk reduction of strontium-reduced water
 - To reduce the risks of strontium-reduced water, treatment using existing, additional and high-performance multi-nuclide removal equipment is underway. Up until March 24, 2022, approx. 836,000 m³ had been treated.



*1: Water amount for which the water-level gauge indicates 0% or more
*2: To detect storage increases more accurately, the calculation method was reviewed as follows from February 9, 2017: (The revised method was applied from March 1, 2018)
[(Inflow of groundwater/rainwater into buildings) + (other transfer) + (chemical injection into ALPS)]
*3: Changed from December 13, 2018 from rainfall in Namie to that within the site.
*4: Considered attributable to the fluctuation inflow of groundwater, rainwater, and others to buildings due to the decline in the level of contaminated water in buildings.
(Febuary 4-11, June 3-10 and July 8-22, 2021)
*5: The notation of treated water by the multi-nuclide removal equipment and others was reviewed in accordance with redefining of ALPS treated water by the Government (April 27, 2021)

Figure 3: Status of stagnant water storage

- Temperature increase in the temperature measuring tube 150-7S of the land-side impermeable walls
 - Before implementing work for the trail water stoppage, nine steel sheet piles to the muddy depth were installed during the period February 22 – March 2.
 - Regarding the underground temperature in the temperature measuring tube 150-7S after February 23 when the installation of steel sheet piles started, the temperature of T.P.+8.5 - T.P.+5.5m started to recover in strata and T.P.+3.5m - T.P.-0.5m shifted to decline.
 - Immediately after the earthquake on March 16, when the brine supply was suspended, the underground temperature increased. However, as the brine supply recovered, the temperature began declining again and has continued to decline.
 - As effects were identified in multiple items, the water-stoppage effects of installing steel sheet piles were confirmed and at this time, the underground temperature increase was considered attributable to the formation of new water routes and the inflow of groundwater at a higher temperature than that in the surrounding area.
 - Temperature monitoring will continue, while measures to add frozen pipes to around the temperature measuring tube 150-7S and stop water in unclosed parts under the pipes of the spent fuel pool will be implemented if deemed necessary.
- Decline of the liquid level in the brine tanks in the land-side impermeable walls
 - On February 15, when the brine supply pump was stopped for the test to reduce the risk of refrigerant (brine*) leakage at the land-side impermeable walls in the event of the Chishima-Trench tsunami arrival, a decline in the brine tank liquid level was detected. The valve was closed as an emergency measure, and the decline stopped.

* Refrigerant (brine): Liquid calcium chloride (the same ingredients as the snow melting agent sprayed on roads during snow fall)

- Later, leakage from the brine pipe connection was detected. The rubber ring of that connection was replaced and brine supply resumed in all areas on February 21.
 - In the on-site investigation, the coupling joint at the leakage part was removed and subsequently found to be misaligned. The cause of this misalignment is being investigated, but given the on-site conditions, it is considered largely attributable to the influence of freezing.
 - Some spare parts have already been procured and further procurement of spare parts continues to be examined and responded. With the specific characteristics of each area in mind, examination will proceed, including a future inspection plan.
- **Future policy toward dismantling E area tanks**
- In the E area, there are E-D1 tanks, for which sludge collection will start from April 2022 and E-D2 tanks, for which treatment of residual water will start from end of March 2022.
 - For sludge collection from E-D1 tanks, as the sludge contains considerable α -nuclide, strict countermeasures to α -contamination (to prevent internal intake and dispersal) will be implemented and proceed carefully.
 - In treatment of residual water to be implemented for both E-D1 and E-D2 tanks, water-sprinkling hoses will be injected from the top-panel manhole to clean the internal tank walls. Workers will then enter the tanks from the side manholes to treat residual water in the tank bottom, collect clads and clean the bottom. Residual water inside the tanks will be transferred to the Process Main Building.
 - Regarding workers' equipment, given the environment inside the tanks, extra equipment supplementing the regular R-equipment to counter α -nuclide and high-level β will be worn during work. Further additional equipment to prevent any intake of α -nuclide and exposure to high-level β will also be introduced.
- **Operation progress report of the high-performance multi-nuclide removal equipment and preparation of pre-service inspection**
- For the continued generation of contaminated water, from the viewpoint of the amount of water that can be processed and the ease of adjustment, and other factors, the additional and existing ALPSs were operated until September 2021 and the high-performance ALPS on stand-by.
 - Given that considerable time has elapsed from the performance verification operation in FY2015, toward future secondary treatment of "water treated with multi-nuclide removal equipment, etc.," to optimize facility operation, including the high-performance ALPS, as well as the additional and the existing ALPSs, preparation to operate the high-performance ALPS proceeded from November 2021.
 - In FY2015, it was confirmed that regarding the water quality of Sr-reduced water (RO concentrated water) at the time, for nuclides except for tritium, the high-performance ALPS could reduce the sum of concentration ratios required by law to less than 1. To further improve system operation, more operational insights and data are being collected.
 - This time, to refine the system operation, more data regarding the configuration of adsorption vessels was being collected. After reconfiguring some adsorption vessels, the high-performance ALPS was operated for the period February 8-14 and its removal performance for the present Sr-reduced water (RO concentrated water) was confirmed.
 - When the adsorption vessels tested this time were configured, the sum of concentration ratios required by law exceeded 1. In a configuration that can reduce the sum of concentration ratios required by law to less than 1, data necessary for the pre-operation inspection will be collected.
 - The related analytical results are being disclosed on the website of TEPCO Holdings, Inc. as "Daily Analysis Results on Radioactive Material at Fukushima Daiichi Nuclear Power Station."
- **Collection status of resin leaking from the Reactor Water Clean-up System spent resin tank room in the Unit 3 Filter Sludge Tank Room (FSTR) building**
- On September 1, 2020, leakage of waste liquid and spent resin was detected from pipes connected with the Reactor Water Clean-up System spent resin storage tanks on the basement floor of the Unit 3 Filter Sludge Tank Room (FSTR) building.

- Spent resin having leaked started to be collected from June 2021 and was then transferred to the waste sludge storage tank (B) of the FSTR building. Approx. 20% of the resin was collected but since a portion could not be collected via the initially planned method, work was suspended in July 2021.
- The collection method was reviewed and work resumed from December 15, 2021. Collection outside the tanks was almost completed but as issues were identified inside the tanks, new methods are being examined. After an on-site investigation, mockup tests and others, the target is to collect the resin by the end of June 2022.

➤ **Status of review about the handling of zeolite sandbags**

- On the second basement level (lowest floor) of the Process Main Building (PMB) and High-Temperature Incinerator Building (HTI), a high radiation dose was measured at zeolite and activated carbon sandbags, which had been installed to adsorb radioactive materials in contaminated water in buildings. In response, countermeasures are being examined, centering on underwater collection, with which water shielding effect is expected.
- For zeolite sandbags and others on the lowest floor of PMB and HTI, collection will commence within FY2023. To commence at an earlier stage and allow more effective work, the collection will be divided into two works: "accumulation" and "enclosure in containers."
- Accumulation and enclosure in containers will be remotely controlled using a remotely operated vehicle (ROV) and others. Each of the Zeolite sandbags and others will be dehydrated within buildings and then enclosed in containers. Subsequently, they will be transported and stored in temporary storage in an area 33.5m above sea level.
- As PMB and HTI may be used to temporarily store contaminated water from Units 1-4 buildings during heavy rain, accumulation and enclosure in containers of zeolite sandbags and others on the lowest floor will not be conducted simultaneously but in order. The target for work completion is within 2024 and after that, floors of PMB and HTI will be exposed.

➤ **Status of work to transfer slurry of the High Integrity Container (HIC)**

- Slurry generated from the existing and additional multi-nuclide equipment is contained and stored in High Integrity Containers (HICs).
- Among HICs affected by the β -ray irradiation of slurry, for those whose integral dose was evaluated as exceeding 5,000kGy*, slurry was being transferred.

* Cumulative absorbed dose of which structural soundness in the event of a fall is confirmed

- In the slurry transfer, the validity of measures to reduce exposure was confirmed for two HICs with low Sr-90 concentration. Based on these results, the third and later transfer was conducted in February 2022 for HICs whose cumulative absorbed dose exceeded 5,000kGy.
- During the transfer for the third HIC, no significant exposure or intake of workers were detected.
- For HICs whose cumulative absorbed dose exceeds 5,000kGy, work continues while introducing appropriate improvement as necessary, based on the work status and with safety first.
- For these HICs, transfer to HICs is targeted to be completed within FY2023.
- The number of HICs for transfer is increasing over time until the slurry stabilization equipment goes into operation. They will be responded to continuously after FY2024.

➤ **Status of response to the Unit 1/2 exhaust stack drain sump pit**

- For the Unit 1/2 exhaust stack drain sump pit, in which highly concentrated contaminated water was detected, drain facilities were installed to prevent any leakage outside the system and measures implemented to suppress inflow to the pit. However, the inflow continued.
- An investigation around the pit revealed a manhole in the area southeast of the pit. After covering the manhole, the water level in the pit increased during rainfall.
- On December 22, 2021, when the manhole conditions were investigated, a space was detected in the manhole lid. On December 23, when sprinkling around the manhole, sprinkled water flowed into the manhole and the water level of the pit rose.
- On March 29, 2022, the inside of the pit was investigated while sprinkling water around the manhole and the inflow

point was located.

- As measures to correct the space in the manhole, which is the inflow point to the pit and suppress the inflow, the manhole lid will be replaced. Subsequently, water will again be sprinkled and the inside will be re-investigated to verify the effectiveness of the measure.
- No decline in the water level was confirmed, except for when the drain pump was operated, nor any leakage outside the system.

Fuel removal from the spent fuel pools

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

➤ Main work to help spent fuel removal at Unit 1

- From late April 2021, work to assemble a temporary gantry and others has been underway in a yard outside the site as part of efforts to install a large cover.
- A work yard was prepared around the Reactor Building and work to install a large cover started from August 2021.
- Before installing the anchor of the large cover, the exterior walls of the Reactor Building were investigated. An investigation of representative parts on the west side of the building revealed that both cracking and concrete strength were within the assumed range and that the anchor would be installable as planned.

➤ Main work to help spent fuel removal at Unit 2

- Decontamination to suppress dust scattering on the top floor of the Reactor Building was completed in December 2021. Contamination reduction was confirmed based on the smear sampling results. Installation of shielding started from February within the range including the reactor well, where the highest dose was observed.
- From October 28, 2021, ground improvement work started before installing the gantry for fuel removal. Approx. 34% was completed as of January 26 and the remainder will be completed by April 2022.

Retrieval of fuel debris

➤ Progress status toward Unit 1 PCV internal investigation

- To acquire information related to the construction plan to collect deposits and others toward fuel debris retrieval, a remotely operated underwater vehicle (ROV) will be inserted into the basement within the PCV from X-2 penetration to investigate inside and outside the pedestal.
- From November 5, preliminary work is underway, such as covering the work area and installing equipment and materials in the on-site headquarters and the remote-control room, before the PCV internal investigation.
- On January 12, when powering on the investigative equipment such as the submersible ROV sequentially, a malfunction was detected, whereby the dosimeter data incorporated in the submersible ROV was not displayed correctly. Work was temporarily suspended.
- For February 4-7, after implementing countermeasures for the above event, operation was verified and no recurrence of the event was confirmed. Work to resume the investigation was conducted.
- On February 8, the submersible ROV-A was inserted into the PCV and guide rings were installed at four points by February 9.
- With these preparations completed, on March 14, the submersible ROV-A2 was inserted as part of efforts to commence a detailed visual inspection of the outside pedestal perimeter.
- After the Fukushima Prefecture Off-coast Earthquake on March 16, the PCV water level declined. To obtain the water level necessary for the investigation, the water injection rate into the reactor was increased.
- On March 29, the water level was checked by the submersible ROV-2. An increase in water level was confirmed but due to transparency loss of the mounted camera and others, it was considered that the investigation could not continue. Replacement with another ROV-A2 and the schedule to resume the investigation will be examined.

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

- The trial retrieval equipment for Unit 2 fuel debris, which had been developed in the UK, arrived in Japan on July 10.

- The ongoing performance verification test in a domestic factory (Kobe), which started from August, finished on January 21.
- The equipment was transported from January 28 and the robot arm arrived on January 31 and the enclosure, on February 4, at the Naraha Center for Remote Control Technology Development of the Japan Atomic Energy Agency (JAEA) (hereinafter referred to as the “Naraha mockup facility”).
- From February 14, the performance verification test and operational training started at the Naraha mockup facility.

➤ Response regarding residual gas detected in pipes of the Unit 3 residual heat removal (RHR) system

- The structural outline around the RHR heat exchanger and assumed gas inflow mechanism immediately after the earthquake to present were estimated.

➤ Status of work to remove a portion of the pipes of the Units 1 and 2 standby gas treatment system (SGTS)

- As countermeasures to malfunctions detected up to March 2, parameters like oil pressure and flow rate, which can ensure stable cutting, were identified and the hydraulic oil was maintained at a temperature of 30-40°C, the value recommended by the manufacturer. From March 27, pipe cutting via the remotely operated cutter started.
- Subsequently, cutting of SGTS pipes proceeded carefully but the same day, the wire saw blade of the cutter bit into the pipe and the wire saw could not operate. Despite efforts made to resolve the problem, the biting issue remained. On March 27, operation was suspended, pipe gripping of the cutter was released and the cutter was lifted down by the crane.
- The cause of the wire saw blade biting into the pipe is being investigated and remains unclear at present. Following prompt identification of the cause, recurrence prevention measures will be examined.

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

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

➤ Management status of the rubble and trimmed trees

- As of the end of February 2022, the total storage volume for concrete and metal rubble was approx. 318,500 m³ (+2,800 m³ compared to the end of January with an area-occupation rate of 85%). The total storage volume of trimmed trees was approx. 140,500 m³ (-400 m³, with an area-occupation rate of 80%). The total storage volume of used protective clothing was approx. 28,000 m³ (+1,000 m³, with an area-occupation rate of 53%). The increase in rubble was mainly attributable to work around Units 1-4. As of the end of February 2022, there were 13 temporary deposits with storage capacity exceeding 1,000m³ and a total storage volume of 54,100 m³.

➤ Management status of secondary waste from water treatment

- As of March 3, 2022, the total storage volume of waste sludge was 438 m³ (area-occupation rate: 63%), while that of concentrated waste fluid was 9,311 m³ (area-occupation rate: 90%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal equipment and other vessels, was 5,312 (area-occupation rate: 83%).

➤ Progress status of the Additional Radioactive Waste Incinerator

- For the period from March 1-4, 2022, a hot test was conducted by incinerating actual waste.
- The test results confirmed no abnormality in the incineration performance and parameters including the prescribed incinerator capacity and exhaust gas radiation monitor values were the same as measured during the cold test. This meant the waste could be supplied and the incinerator ash filled without any issue.
- After the earthquake on March 16, negative pressure was maintained inside the incinerator and no external leakage of radioactive materials, such as dispersal of ash, was detected. When visually inspecting the facility after the earthquake, although some malfunctions were found, no significant safety damage that would affect the function or performance of the incinerator was detected.

- Among the detected malfunctions, all related to the incinerator were restored. As no abnormality was found in the verification of equipment operation, construction of the incinerator was completed in March 31.
- Restoring building-related malfunctions (fireproof board separating off the wall) will take time. The operational start schedule will be reviewed based on the construction period for restoration.

Reactor cooling

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

➤ Results regarding reduction in the water injection rate into Unit 2 and 3 reactors

- Based on the results of tests to stop water injection and the temperature evaluation of the Reactor Pressure Vessel (RPV) and the Primary Containment Vessel (PCV), the water injection rate has room in terms of maintaining stable cooling. As part of work to reduce the volume of contaminated water generated in buildings by suppressing the ground water inflow, the possible amount of freshwater (source water) generated will also decline, there will be the need to reduce the water-injection rate.
- Therefore, for Units 2 and 3, which maintain stable PCV water levels, the water injection rate was reduced in steps, from the existing 3.0 m³/h to the target figure of 1.7 m³/h.
- As no abnormality was confirmed in parameters such as the RPV bottom temperature, PCV temperature and dust concentration of the PCV gas control facility, Units 2 and 3 were migrated to production operation from March 10 and January 6 respectively.

➤ Test to stop water injection into the Unit 3 reactor

- Regarding Unit 3, in the previous test to stop water injection into the reactor (which was stopped for seven days in April 2021), leakage from the PCV was below the experience water level. To ensure safety while retrieving debris, leakage points need to be identified.
- Moreover, as a concrete method for retrieving future debris is being examined, the feasibility of air cooling for fuel debris and the lowest water injection rate for water cooling must also be identified.
- A test involving stop of water injection for a longer period (three months) than in the previous test will be conducted to identify whether there is any leakage during the course of decline in the PCV water level and detect any influence during long-term water injection stoppage.
- As the RPV and PCV temperatures and dust concentration may rise by the water injection stoppage, measures such as setting a management target temperature and enhancing the monitoring of dust concentration via a continuous dust monitor, will be implemented during the test. Moreover, for PCV water-level decline, the test will be conducted at a water level above the lower end of the PCV new thermometer / water-level gauge.
- After setting the continuous dust monitor, conducting trial operation and confirming the background, the water injection stoppage test will start from May 2022.

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

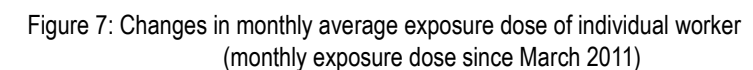
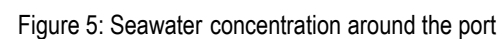
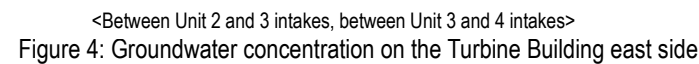
- In the Unit 1 intake north side area, the H-3 concentration was below the legal discharge limit of 60,000 Bq/L at all observation holes and remained constant or has been declining overall. The concentration of total β radioactive materials has remained constant overall but increased temporarily from April 2020 and is even increasing or declining at many observation holes at present, including Nos. 0-1-2, 0-3-1, 0-3-2 and 0-4. The trend continues to be monitored carefully.
- In the area between the Unit 1 and 2 intakes, the H-3 concentration has remained below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing or declining at Nos. 1-14, 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 at No. 1-6 and increasing or declining at many observation holes, including Nos. 1-9, 1-11, 1-12, 1-14, 1-16 and 1-17. The trend continues to be monitored carefully.

- In the area between the Unit 2 and 3 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has been increasing and declining at Nos. 2-3 and 2-5 but has remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall but been increasing or declining at Nos. 2-3, 2-5 and 2-6. The trend continues to be monitored carefully.
- In the area between the Unit 3 and 4 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has remained constant or been declining overall. The concentration of total β radioactive materials has remained constant overall or been declining overall but been increasing or declining at many observation holes including Nos. 3, 3-2, 3-4 and 3-5. The trend continues to be monitored carefully.
- In the groundwater on the east side of the Turbine Buildings, the same as that of total β radioactive materials, the concentration of cesium has also remained constant but been increasing or declining and exceeding the previous highest record at some observation holes. Investigations are underway.
- In the radioactivity trend of the groundwater on the east side of the Turbine Buildings, as record high values were indicated at many points after March 2020, groundwater fluctuations were investigated for the period January to February 2022. The subject points were checked by the underwater camera but no deposit was confirmed at the bottom and the sampling height. From the results of Cs-134 and -137 radioactivity concentration measured after filtration, all investigated groundwater contained much more soluble cesium than insoluble cesium. Regarding the total β radioactivity concentration, as time passed until measurement after filtration from sampling, values exceeding those at the time of sampling were indicated due to the generation of Y-90. Data will be re-collected for a month or so after April and the investigation will continue.
- During the recent two months, the record high data was not updated. From now on, when record high data is indicated, it will be compared with data obtained in this investigation and evaluated.
- The concentration of radioactive materials in drainage channels has remained constant overall, despite increasing during rainfall.
- In the open channel area of seawater intake for Units 1 to 4, the concentration of radioactive materials in seawater has remained below the legal discharge limit and been declining long term, despite temporary increases in Cs-137 and Sr-90 noted during rainfall. They have also been declining following the completed installation and the connection of steel pipe sheet piles for the sea-side impermeable walls. The concentration of Cs-137 has remained slightly higher in front of the south side impermeable walls and slightly lower on the north side of the east breakwater since March 20, 2019, when the silt fence was transferred to the center of the open channel due to mega float-related construction.
- In the port area, the concentration of radioactive materials in seawater has remained below the legal discharge limit and been declining long term, despite the temporary increases in Cs-137 and Sr-90 observed during rainfall. They have remained below the level of those in the Units 1-4 intake open channel area and been declining following the completed installation and connection of steel pipe sheet piles for the sea-side impermeable walls.
- In the area outside the port, regarding the concentration of radioactive materials in seawater, those of Cs-137 and Sr-90 declined and remained low after steel pipe sheet piles for the sea-side impermeable walls were installed and connected. Regarding the concentration of Cs-137, a temporary increase was sometimes observed on the north side of the Unit 5 and 6 outlets and near the south outlet due to the influence of weather, marine meteorology and other factors. Regarding the concentration of Sr-90, variation has been observed since last year 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.

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.

- The monthly average total of personnel registered for at least one day per month to work on site during the past quarter from November 2021 to January 2022 was approx. 9,000 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 6,800). Accordingly, sufficient personnel are registered to work on site.
- It was confirmed with the prime contractors that the estimated manpower necessary for the work in April 2022 (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 4,200.
- The number of workers both from within and outside Fukushima Prefecture decreased slightly. The local employment ratio (cooperating company workers and TEPCO HD employees) as of February 2022 remained constant to around 70%.
- The average exposure doses of workers were at approx. 2.44, 2.54 and 2.60 mSv/person-year during FY2018, 2019 and 2020, 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.



➤ Countermeasures to suppress the spread of COVID-19 infections

- The semi-state of emergency COVID-19 measures applied to 18 prefectures including Tokyo was totally lifted on March 21. However, for TEPCO HD employees and cooperating company workers at the Fukushima Daiichi Nuclear Power Station, countermeasures to prevent the infection spreading, such as requiring employees to take their temperature before coming to the office, wear masks at all times, avoid the “Three Cs” (Closed spaces, Crowded places, Close-contact settings) by using the rest house in shifts, eat silently and carefully select business travel, will continue to be properly implemented. In addition, they must strictly check their physical conditions, including of their family members, before coming to the company at the beginning of the week, report to their supervisors and managers whether they have contact of “Three Cs,” many people or unspecified number of people or not and receive an antigen test when they return to Fukushima prefecture from the outside to proceed decommissioning work with safety first.
- As of 15:00, March 30, 2022, 232 workers (including 36 TEPCO HD employees, one temporary worker, 193 cooperating company workers and 2 business partner company employees) of the Fukushima Daiichi NPS had contracted COVID-19. Since January 2022, a total of 128 workers (including 26 TEPCO HD employees, 101 cooperating company workers and 1 business partner company employee) had contracted COVID-19.
- No significant influence on decommissioning work, such as a corresponding delay to work processes due to this infection, had been identified.
- The third workplace vaccination of COVID-19 was implemented for the period March 28-30 to 27 TEPCO HD employees and 52 cooperating company workers.
- Acceptance of inspectors resumed from March 22.

➤ Measures to prevent infection and expansion of influenza and norovirus

- Since November 2021, 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, 2021 to January 29, 2022) for cooperating company workers. As of January 29, 2022, a total of 4,866 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 12th week of 2022 (March 21-27, 2022), no influenza and six norovirus infections were recorded. The totals for the same period for the previous season showed one influenza and one norovirus infection respectively.

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 Units 5 and 6

➤ Status of spent fuel storage in Units 5 and 6

- Regarding Unit 5, fuel removal from the reactor was completed in June 2015. A total of 1,374 spent and 168 non-irradiated fuel assemblies, respectively, were stored in the spent fuel pool (storage capacity: 1,590 assemblies).
- Regarding Unit 6, fuel removal from the reactor was completed in November 2013. A total of 1,456 spent and 198 non-irradiated fuel assemblies (180 of which transferred from the Unit 4 spent fuel pool) are stored in the spent fuel pool (storage capacity: 1,654), while 230 non-irradiated fuel assemblies are stored in the storage facility of non-irradiated fuel assemblies (storage capacity: 230).

➤ Status of stagnant water treatment in Units 5 and 6

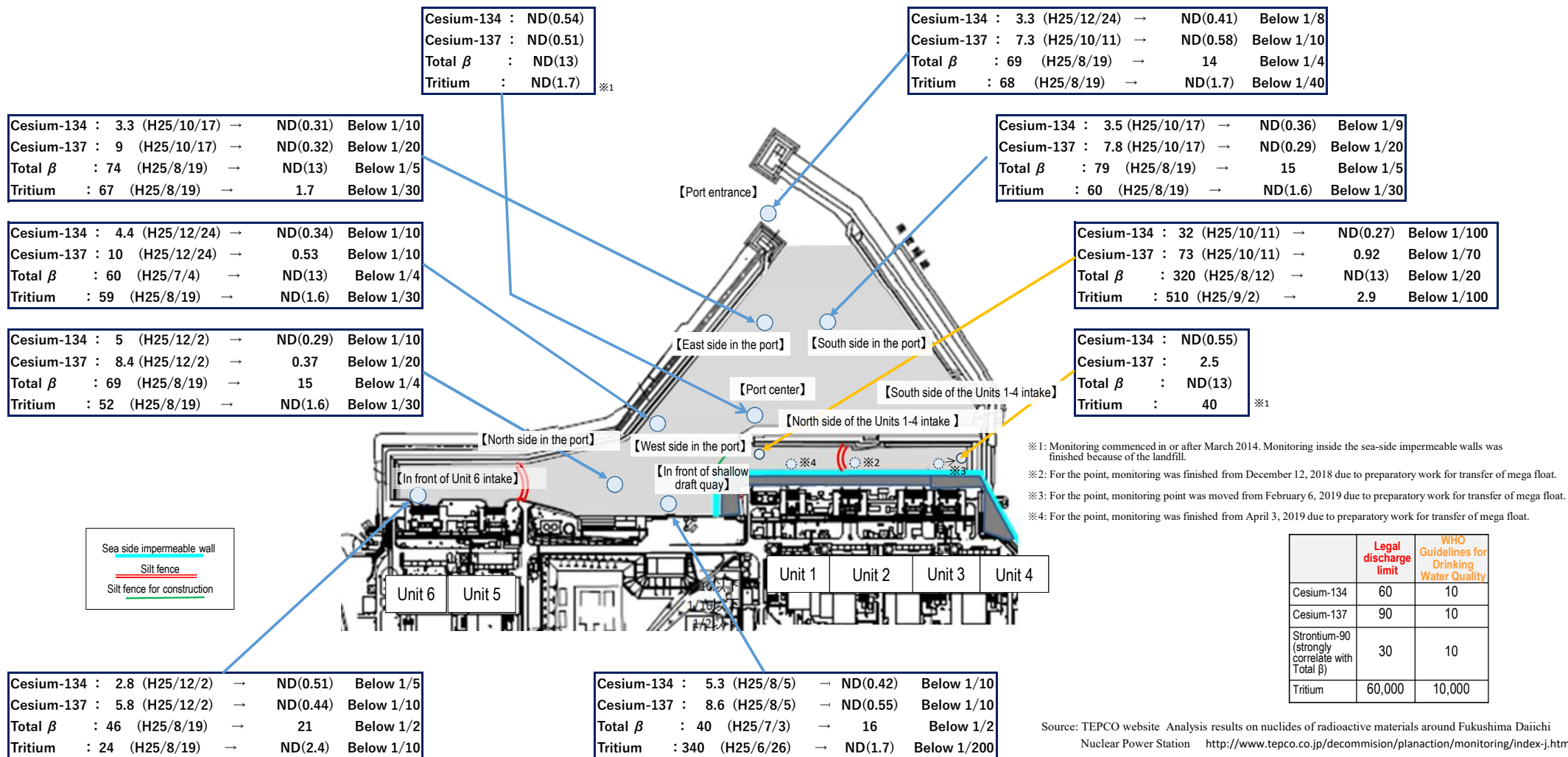
- Stagnant water in Units 5 and 6 buildings is transferred from Unit 6 Turbine Building to the outdoor tanks and sprinkled after undergoing oil separation and RO treatment and confirming the concentration of the radioactive materials.

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

"The highest value" → "the latest value (sampled during March 21-28)"; 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

Summary of TEPCO data as of March 28, 2022



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

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

(The latest values sampled during March 21-28)

Summary of TEPCO data as of March 28, 2022

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

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

Cesium-134	: ND (H25)	→	ND(0.82)
Cesium-137	: ND (H25)	→	ND(0.60)
Total β	: ND (H25)	→	ND(14)
Tritium	: ND (H25)	→	ND(0.87)

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

Cesium-134	: ND (H25)	→	ND(0.72)
Cesium-137	: 1.6 (H25/10/18)	→	ND(0.60) Below 1/2
Total β	: ND (H25)	→	ND(14)
Tritium	: 6.4 (H25/10/18)	→	ND(0.86) Below 1/7

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

Cesium-134	: ND (H25)	→	ND(0.58)
Cesium-137	: ND (H25)	→	ND(0.61)
Total β	: ND (H25)	→	ND(14)
Tritium	: ND (H25)	→	ND(0.86)

Cesium-134	: ND (H25)	→	ND(0.95)
Cesium-137	: ND (H25)	→	ND(0.68)
Total β	: ND (H25)	→	ND(14)
Tritium	: 4.7 (H25/8/18)	→	ND(0.86) Below 1/5

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

【Port entrance】

Cesium-134	: 3.3 (H25/12/24)	→	ND(0.41) Below 1/8
Cesium-137	: 7.3 (H25/10/11)	→	ND(0.58) Below 1/10
Total β	: 69 (H25/8/19)	→	14 Below 1/4
Tritium	: 68 (H25/8/19)	→	ND(1.7) Below 1/40

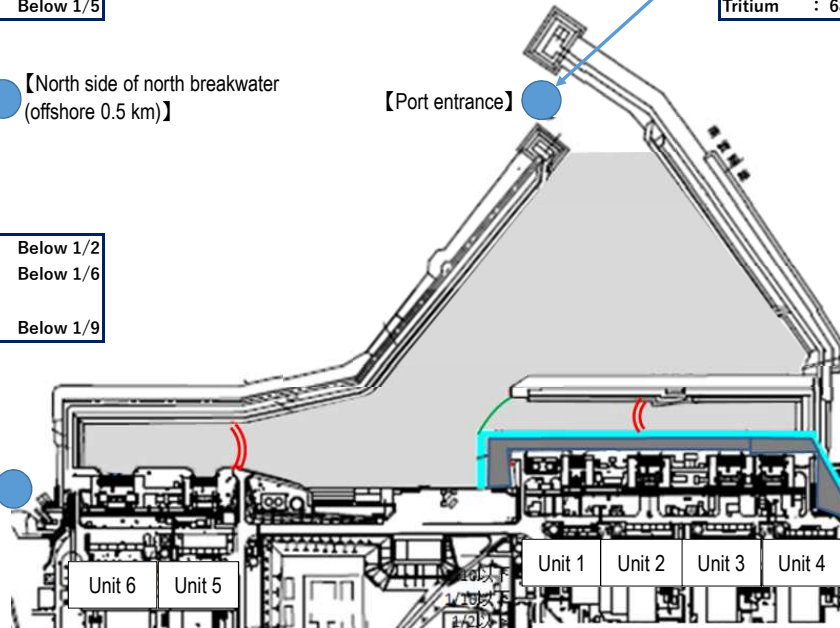
【South side of south breakwater (offshore 0.5 km)】

Cesium-134	: ND (H25)	→	ND(0.88)
Cesium-137	: ND (H25)	→	ND(0.75)
Total β	: ND (H25)	→	ND(14)
Tritium	: ND (H25)	→	ND(0.86)

Cesium-134	: 1.8 (H25/6/21)	→	ND(0.64) Below 1/2
Cesium-137	: 4.5 (H25/3/17)	→	ND(0.65) Below 1/6
Total β	: 12 (H25/12/23)	→	9.2
Tritium	: 8.6 (H25/6/26)	→	ND(0.95) Below 1/9

【North side of Unit 5 and 6 release outlet】

Sea side impermeable wall
Silt fence
Silt fence for construction



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

Cesium-134	: ND (H25)	→	ND(0.76)
Cesium-137	: 3 (H25/7/15)	→	ND(0.71) Below 1/4
Total β	: 15 (H25/12/23)	→	11
Tritium	: 1.9 (H25/11/25)	→	ND(0.95) Below 1/2

【Near south release outlet】

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/decommission/planaction/monitoring/index-j.html>

March 31, 2022



A horizontal scale bar with markings at 0m, 100m, 500m, and 1000m. The segment between 0m and 100m is white, while the segments between 100m and 500m, and between 500m and 1000m, are grey.

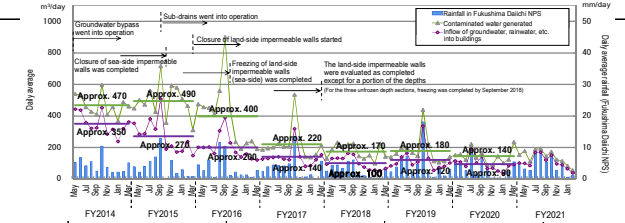
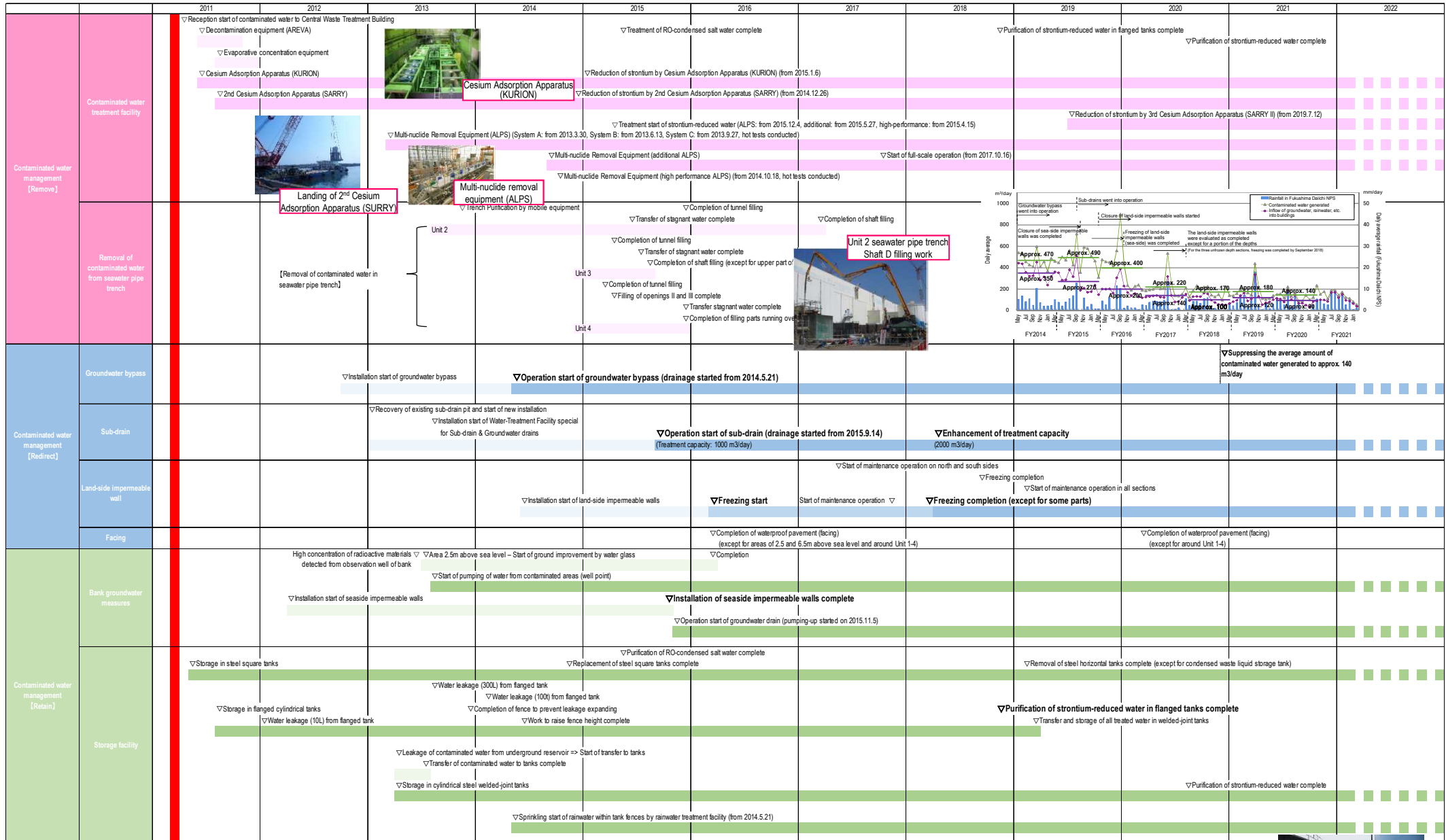
1-1 Contaminated water management

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

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

- [Completed] Suppressing the amount of contaminated water generated to 150 m³/day or less (within 2020)
- Suppressing the amount of contaminated water generated to 100 m³/day or less (within 2025)

Reference
March 31, 2022
Secretariat of the Team for Countermeasures for
Decommissioning, Contaminated Water and Treated Water
1/6



Range	Start day
1st Stage Phase 1: Beaching range	Mar. 11, 2014
1st Stage Phase 2: Beaching range	Jun. 1, 2014
2nd Stage Phase 1: Beaching range	Dec. 1, 2014
2nd Stage Phase 2: Beaching range	Mar. 1, 2015
3rd Stage Beaching range	Aug. 22, 2015



Closure parts of the land-side impermeable walls (on the mountain side)

Pumping well

Sub-drain purification system

Land-side impermeable wall brine (refrigerant) circulation pipe

Construction of welded-joint tanks

Placement of seaside impermeable walls complete

Flanged and welded-joint tanks

1-2 Contaminated water management

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

- [Completed] Treatment of contaminated water in buildings* (within 2020)
- * Except for Unit 1-3 Reactor Buildings, Process Main Building and High-Temperature Incinerator Building
- Reducing contaminated water in Reactor Buildings to about half the amount at the end of 2020 (FY2022-2024)

Reference
March 31, 2022
Secretariat of the Team for Countermeasures for
Decommissioning, Contaminated Water and Treated Water
2/6

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
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 R/B Building				▽Treatment of stagnant water in buildings complete	
								▽Floor exposure of Unit 1 T/B	▽Separation of stagnant water between Units 1 and 2	▽Floor exposure of Unit 1 R/B			
Countermeasures to tsunami risks	Closure of openings		▽Examination start of measures to close building openings		▽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	▽Closure of openings complete
	Seawall	▽Installation of outer-rise tsunami seawall complete								▽Construction start of Tushima Trench Tsunami Seawall		Japan Trench tsunami seawall	▽Completion of installation
	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.

Examination concerning handling of ALPS treated water

2016.6 Report of Tritiated Water Taskforce

Tritiated Water Taskforce (2013.12 – 2016.5, 15 meetings)

2018.8 Explanatory and hearing meeting, receiving opinions

2020.2 Report of Subcommittee on Handling of ALPS treated water

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

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

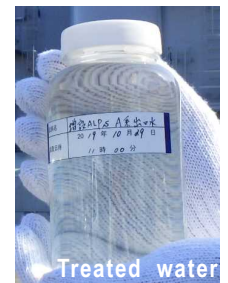
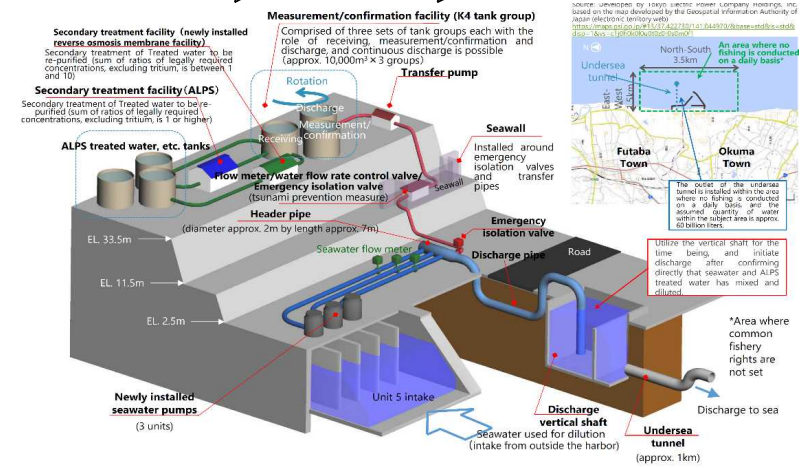
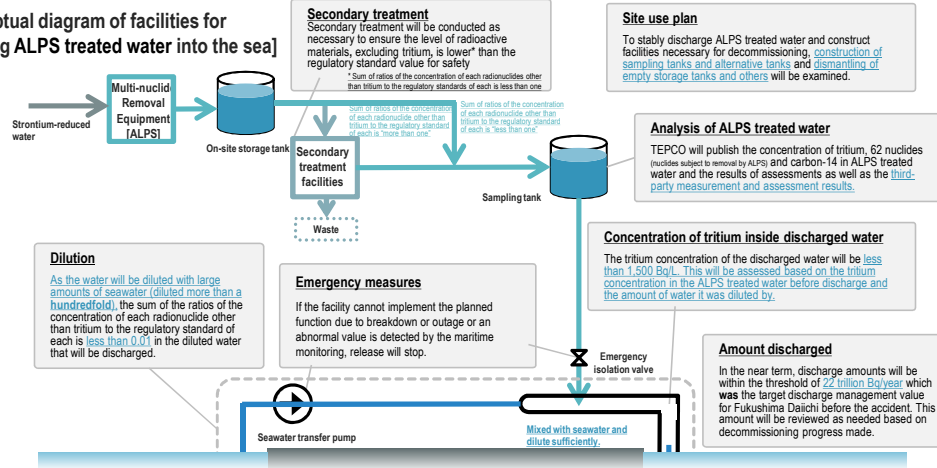
2021.4.13 The basic policy on the handling of ALPS treated water was set
2021.4.16 The response of TEPCO was announced

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)

Tank area viewed from the Large Rest House (2015.10.29)

[Conceptual diagram of facilities for releasing ALPS treated water into the sea]



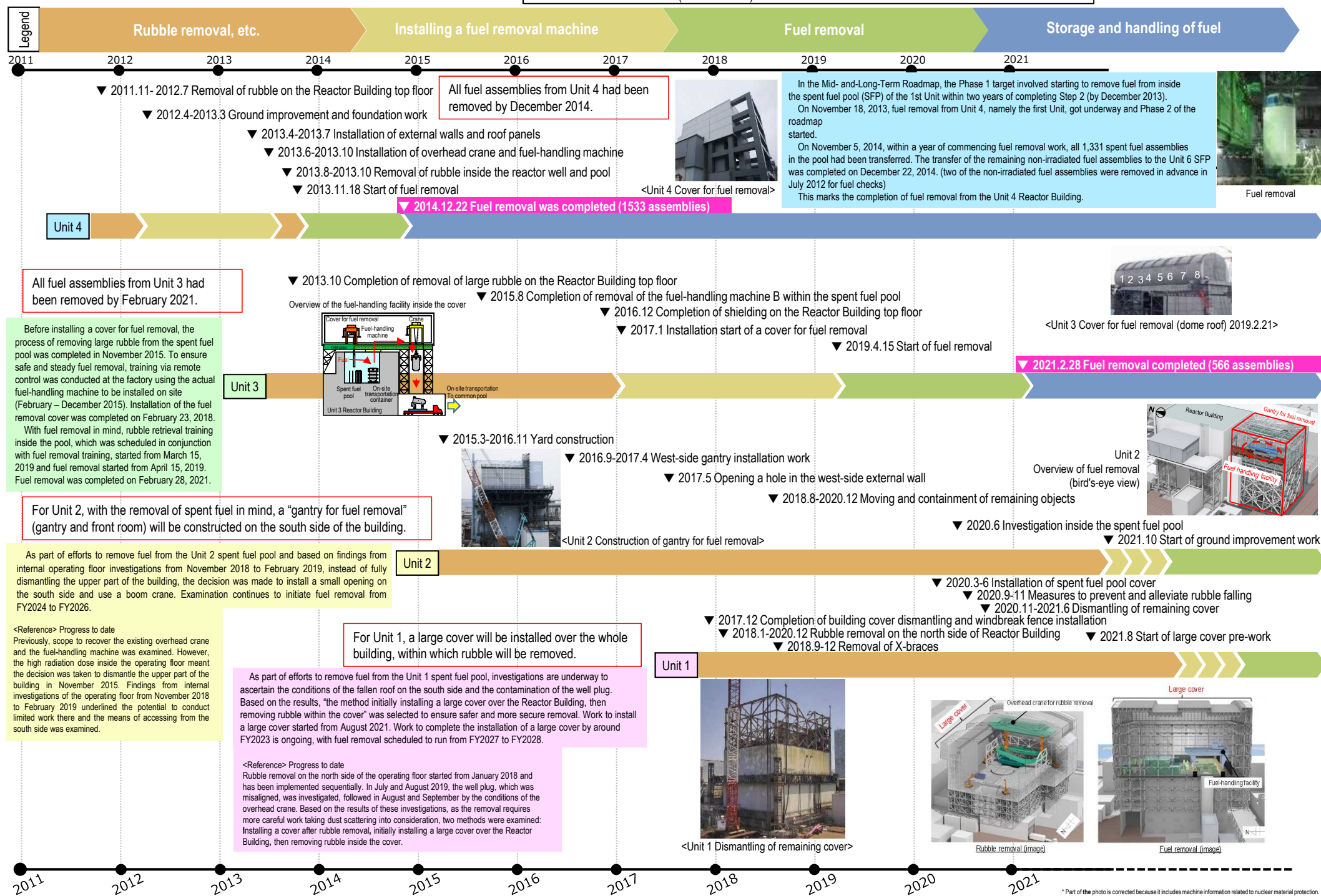
Treated water

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)

Reference
March 31, 2022
Secretariat of the Team for Countermeasures for
Decommissioning, Contaminated Water and Treated Water
3/6



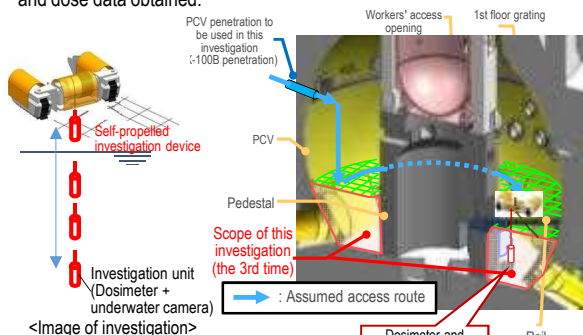
Milestones of the Mid- and Long-Term Roadmap (major target processes)

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.

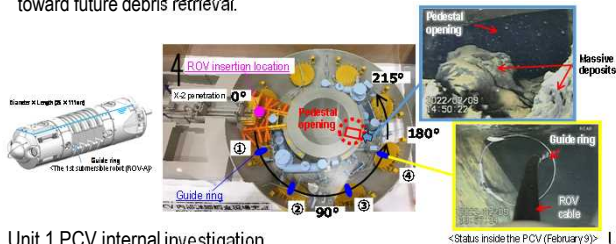
Unit 1 Investigation overview

- In April 2015, a device having entered the inside of the PCV via a narrow opening (bore: $\phi 100$ 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.



In February, the first remotely operated underwater vehicle (ROV-A) was inserted to install "guide rings" which will facilitate the investigation. As installation of guide rings has been completed, then a detailed investigation will be implemented.

In this investigation, distribution of deposits outside the pedestal and their characteristics or others will also be investigated. The results of these investigations will be utilized in the examination of method and procedures toward future debris retrieval.

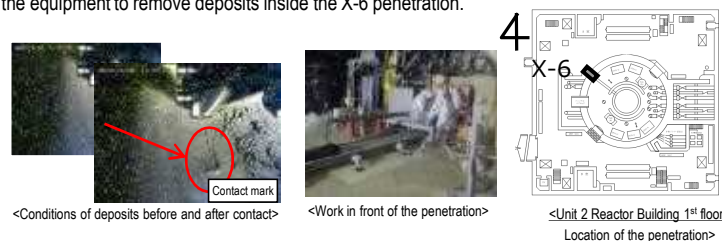


Unit 2 Investigation overview

- 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.



- 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.



Unit 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	<ul style="list-style-type: none">- 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)	<p>Confirming the status of the PCV 1st floor</p> <ul style="list-style-type: none">- Acquiring images- Measuring the air temperature and dose rate- Replacing permanent monitoring instrumentation
	3rd (2017.3)	<p>Confirming the status of the PCV 1st basement floor</p> <ul style="list-style-type: none">- Acquiring images- Measuring the dose rate- Sampling deposit- Replacing permanent monitoring instrumentation
Leakage points from PCV	<ul style="list-style-type: none">- PCV vent pipe vacuum break line bellows (identified in 2014.5)- Sand cushion drain line (identified in 2013.11)	
<p><u>Evaluation of the location of fuel debris inside the reactor by measurement using muons</u> Confirmed that there was no large fuel in the reactor core. (2015.2-5)</p>		

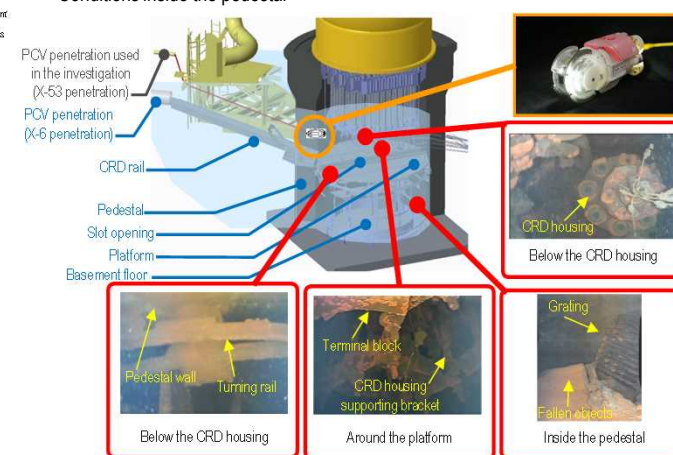
Unit 2 PCV internal investigation

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	
<u>Evaluation of the location of fuel debris inside the reactor by measurement using muons</u> 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)	<ul style="list-style-type: none">- 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)	<ul style="list-style-type: none">- Acquiring images- Installing permanent monitoring instrumentation (2017.8)
Leakage points from PCV	- Main steam pipe bellows (identified in 2014.5)	
<p>Evaluation of the location of fuel debris inside the reactor by measurement using muons</p> <p>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)</p>		

5 Management of solid radioactive waste

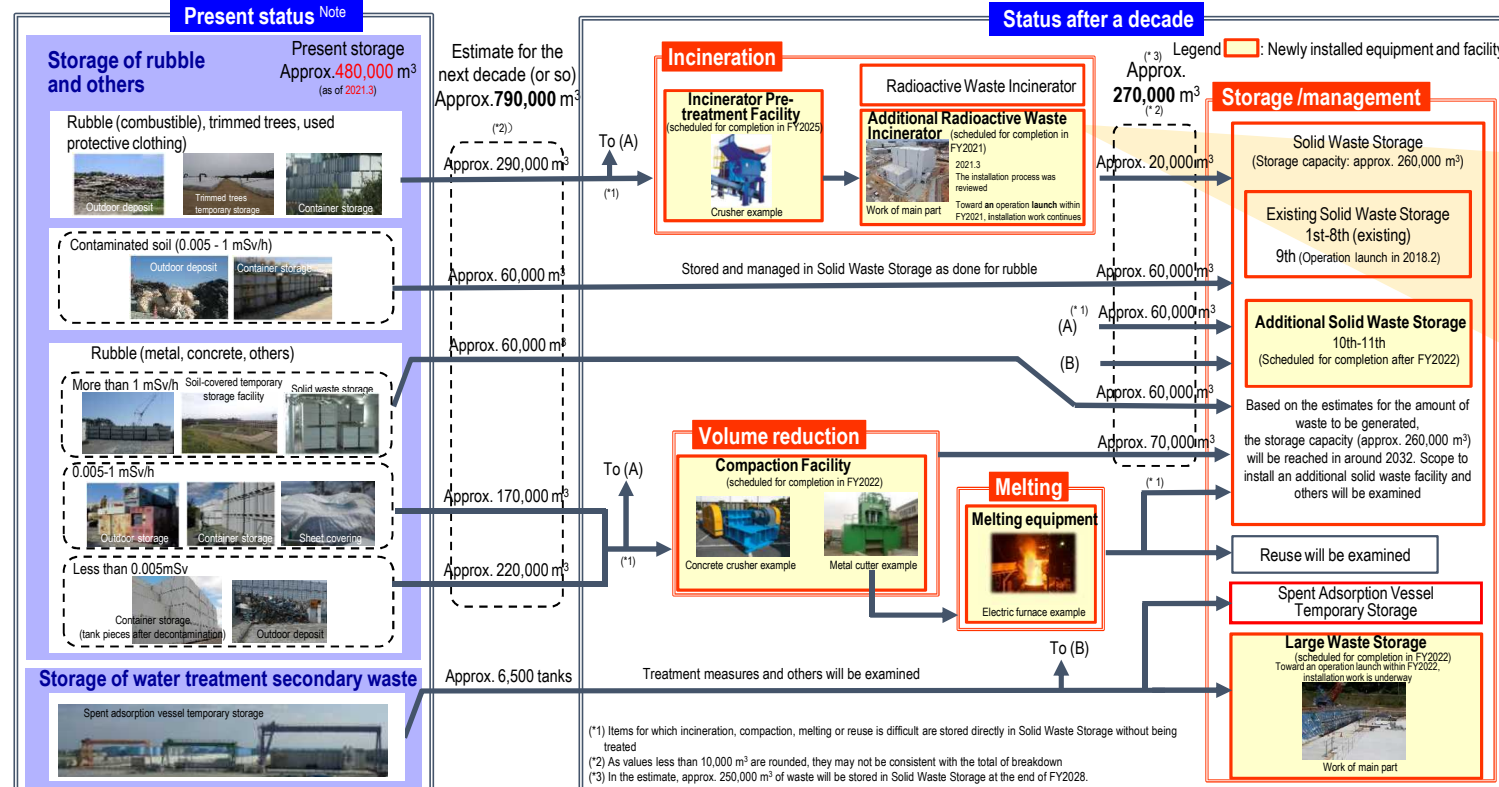
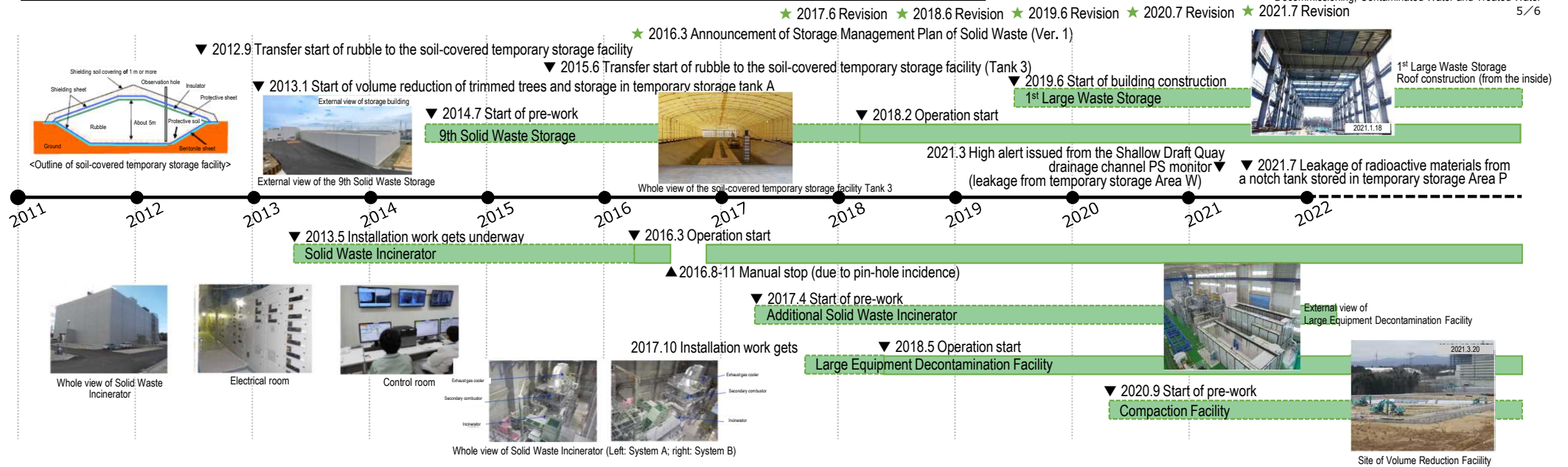
Milestones of the Mid- and Long-Term Roadmap (major target processes)

Eliminating temporary outdoor storage of rubble and others * Except for secondary waste of water treatment and materials for reuse or recycling (within FY2028)

Reference

March 31, 2022

Secretariat of the Team for Countermeasures for
Decommissioning, Contaminated Water and Treated Water
5/6



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

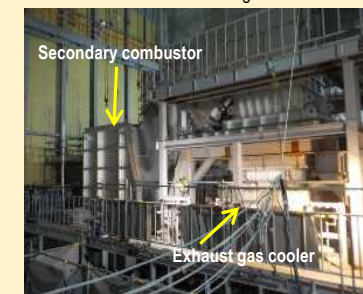
- The exposure dose at the site boundaries will be reduced by aggregation to indoor storage and eliminating outdoor storage.
- The exposure dosage in exhaust gas from incinerators and at site boundaries is measured and announced on the website and others.

● Efforts to eliminate temporary outdoor storage of rubble and others

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



Whole view of the Additional Solid Waste Incinerator Building



Secondary combustor

Exhaust gas cooler

Main equipment

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.

