

## Main decommissioning work and steps

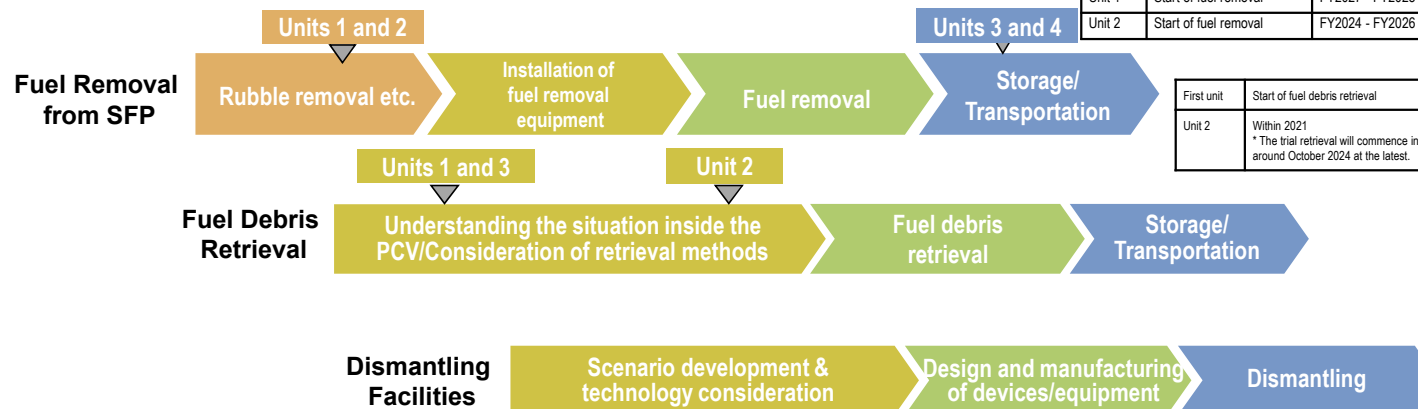
Fuel removal from the spent fuel pool was completed in December 2014 at Unit 4 and on February 28 2021 at Unit 3.  
Work continues sequentially toward the start of fuel removal from Units 1 and 2 and debris (Note 1) retrieval from Units 1-3.

(Note 1) Fuel assemblies having melted through in the accident with nearby metal materials etc.

<Milestones in the Mid- and Long-Term Roadmap>

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

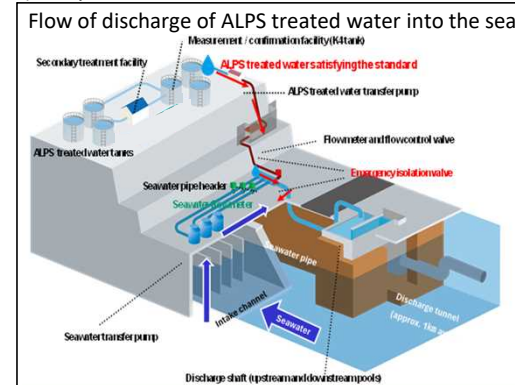
First unit	Start of fuel debris retrieval
Unit 2	Within 2021 * The trial retrieval will commence in around October 2024 at the latest.



## Measures for treated water

### Handling of ALPS treated water

Regarding the discharge of ALPS treated water into the sea, TEPCO must comply with regulatory and other safety standards to safeguard the public, the surrounding environment and agricultural, forestry and fishery products. To minimize adverse impacts on reputation, efforts including enhanced monitoring, ensuring objectivity and transparency by engaging with third-party experts and having safety checked by the IAEA, will continue. Moreover, accurate information will be disseminated with full transparency.



## Contaminated water management - triple-pronged efforts -

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

- "Remove" the source of water contamination
- "Redirect" fresh water from contaminated areas
- "Retain" contaminated water from leakage

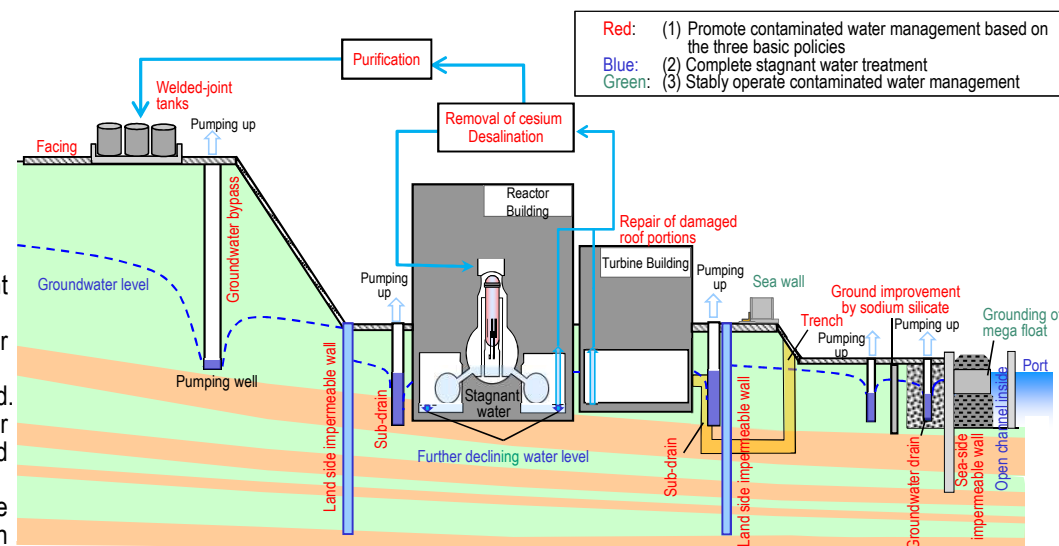
- Strontium-reduced water from other equipment is being re-treated in the Advanced Liquid Processing System (ALPS: multi-nuclide removal equipment) and stored in welded-joint tanks.
- Multi-layered contaminated water management measures, including land-side impermeable walls and sub-drains, have stabilized 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. Through these measures, the generation of contaminated water has been suppressed and reduced, from approx. 540 m<sup>3</sup>/day (in May 2014) before implementing measures to approx. 80 m<sup>3</sup>/day (in FY2023), achieving the milestone of "suppressing the amount of contaminated water generated to 100 m<sup>3</sup>/day or less during average rainfall within FY2025."
- Measures will proceed to further reduce the amount of contaminated water generated and suppress it to approx. 50-70 m<sup>3</sup>/day by FY2028.

### (2) Efforts to complete stagnant water treatment

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

### (3) Efforts to stably operate contaminated water management

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



## Progress status

- 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.

### Discharge of ALPS treated water into the sea

The 2nd discharge of ALPS treated water in FY2024 was completed on June 4 as planned.

In preparation for the 3rd discharge of ALPS treated water in FY2024, Tank Group B of the measurement/confirmation facility was analyzed and TEPCO and an external institute confirmed that the analytical results satisfied the discharge requirement. Following the confirmation, discharge of ALPS treated water of Tank Group B of the measurement/confirmation facility into the sea will commence from June 28.

Regarding tritium in seawater, TEPCO will continue to confirm that the discharge is conducted safely as planned while satisfying the discharge requirement based on daily quick analyses conducted by TEPCO and others.

### Dismantling of tanks

Regarding the welded-joint tanks in the J8 and J9 areas, where facilities related to Unit 3 fuel debris retrieval will be installed, an implementation plan will be submitted after preparation is completed.

Dismantling of tanks will be conducted from late FY2024 to the end of FY2025 and preparation, including treating residual water in tanks and removing peripheral interferences, will be conducted from July.

Work will continue carefully, while prioritizing safety above all.

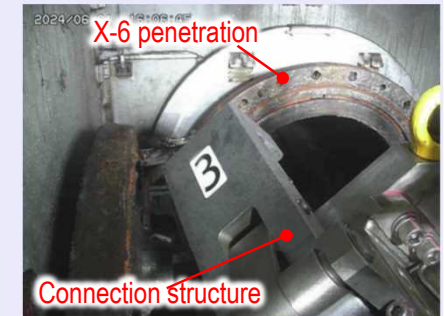
### Unit 2 Status of preparation for fuel debris trial retrieval

The telescopic-type equipment, which will be used in the fuel debris trial retrieval, underwent a pre-service (pressure proof) test by the Nuclear Regulation Authority (NRA) at the factory on June 18 and was determined as "good." At present, preparation for transporting to the Fukushima Daiichi Nuclear Power Station is underway and the equipment will also undergo a test after installation.

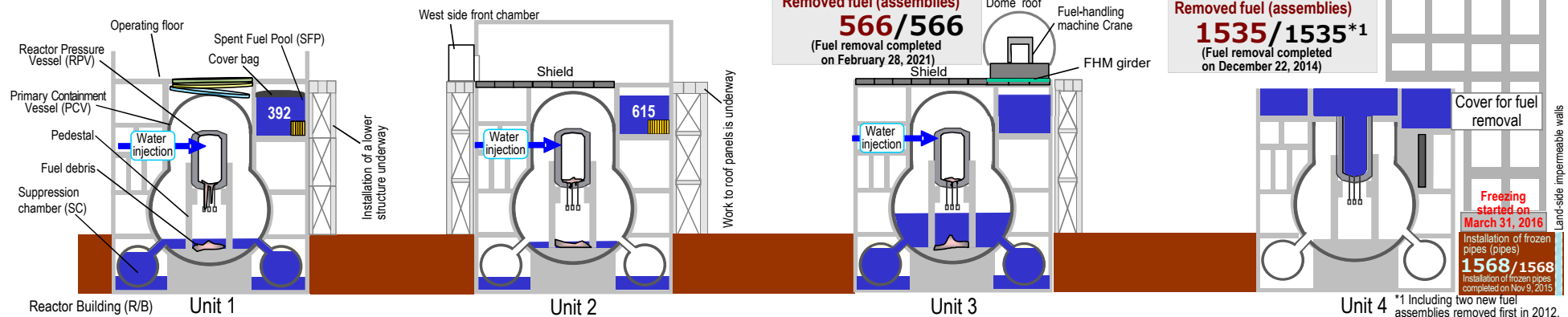
On site, connection of the connection structure and pipes to the penetration (X-6) was completed on June 26. Preparation for installing the telescopic-type equipment to the Reactor Building will continue.

At present, the trial retrieval is expected to commence from around August to October 2024.

Work will continue steadily, prioritizing safety above all.



< Connecting the connection structure to X-6 penetration >



### Measures pertaining to the fish inside the port

In addition to multilayered measures pertaining to the fish inside the port, which have been implemented, the mesh of the net was made finer to prevent the fish from leaving and the net to prevent fish from leaving at the east sea wall was replaced.

Construction to re-cover the seabed of the Units 1-4 intake open channel was completed on June 13. This formed a covering layer, thereby improving the environment and has further enhanced measures for the fish inside the port.

TEPCO will continue to inspect the seabed soil inside the port and boost the water quality in drainage channel K, among other efforts, so as to implement measures, which include improving the overall environment in the port.



< Seafloor re-covering construction (layer of cover) >

### Implementation status of the operational safety inspection

In response to bodily contamination, water leakage from buildings, station power outage and others, which occurred last year, an operational safety inspection was conducted for all works in the station and was completed on June 7. Items to be improved, matters perceived and other issues identified are being improved.

Along with these efforts, risk assessment processes will be enhanced and TEPCO HD employees and cooperating company workers will be educated to handle these activities.

Efforts will continue to proceed with decommissioning safely and steadily.

### Power outage of the Unit 6 high voltage power panel 6c and fire alarm activation

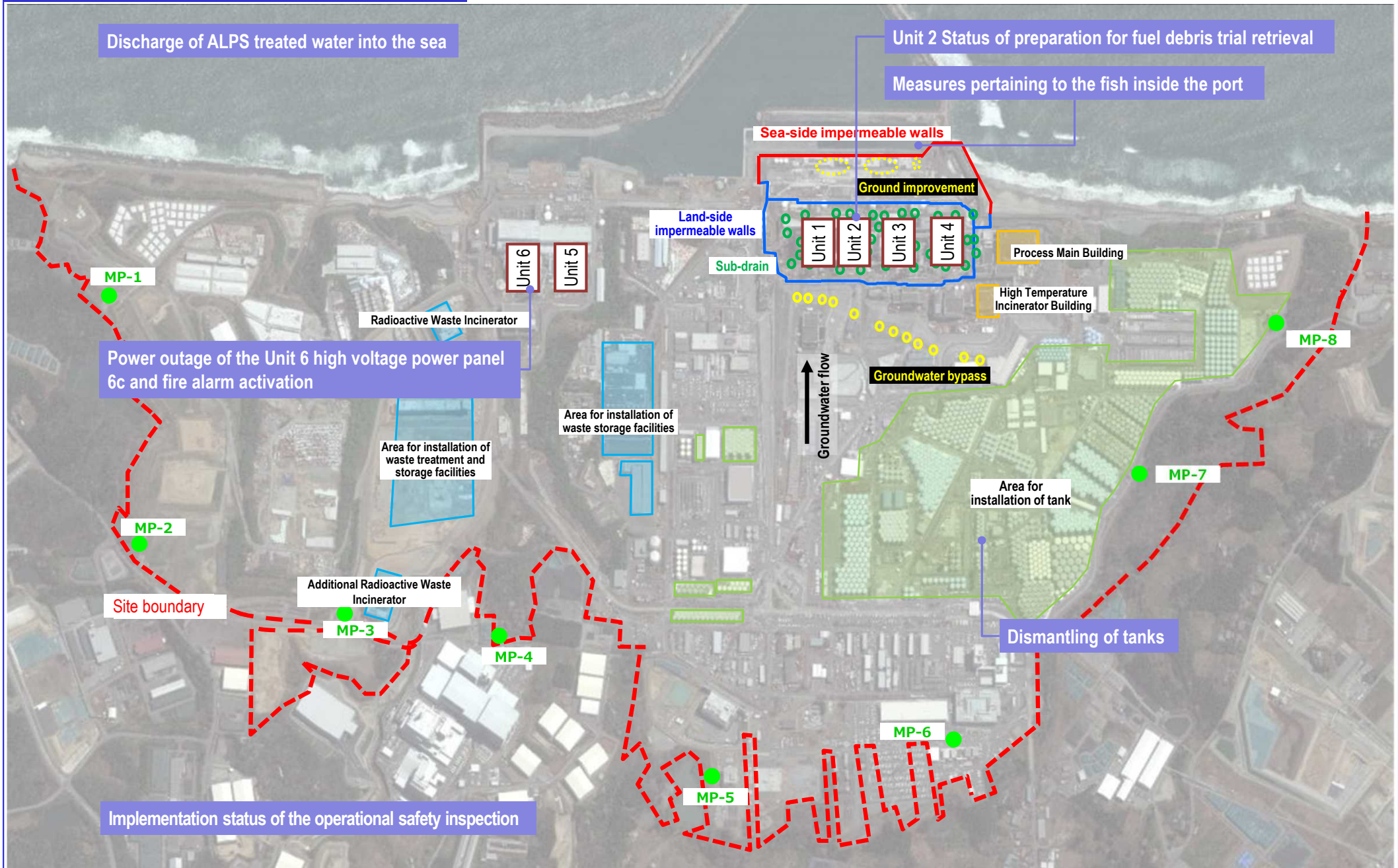
On June 18, the Unit 6 high voltage power panel 6c suffered a power outage. At the same time, the Fuel Pool Cooling and Filtering System (FPC) pump B automatically cut out and the fire alarm on the 1st basement floor of the Unit 6 Turbine Building basement was activated.

It was confirmed that since the spent fuel in the pool had sufficiently cooled, the water temperature would not rise to the limit of the implementation plan. After confirming on-site safety, operation of the FPC pump resumed the same day. Furthermore, no significant variation was confirmed in the water level or in the temperature of the spent fuel pool and monitoring posts.

In addition, an on-site inspection by the public fire department revealed that a fire had occurred. Since damage was detected in the bus conductor in a duct near the ceiling, a short circuit was considered to have occurred. Investigation of the cause will continue.



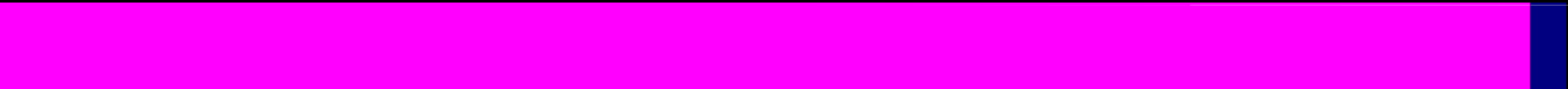
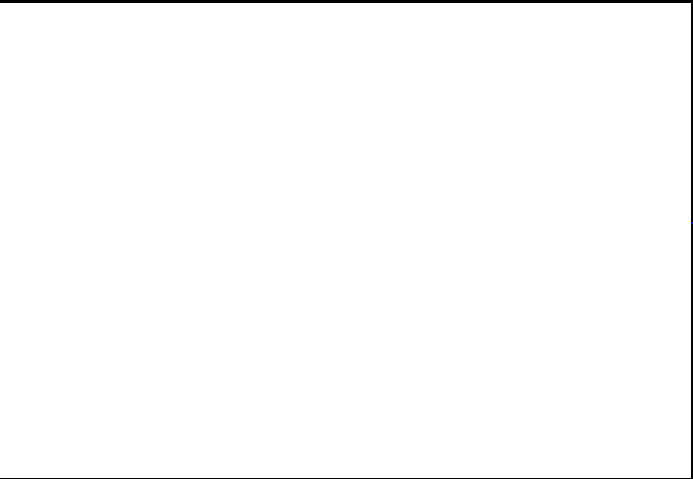
## Major initiatives – Locations on site



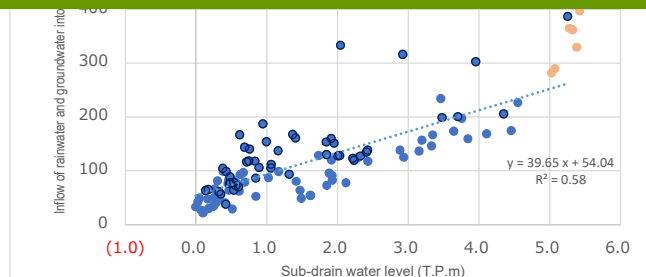
Provided by Japan Space Imaging Corp., photo taken on April 8, 2021  
Product (C) [2020] DigitalGlobe, Inc., a Maxar company

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- Regarding the status of sea-area monitoring on handling ALPS treated water, more tritium measurement points for seawater and fish were established near the power station and off the coast of Fukushima Prefecture and measurements of tritium and Iodine-129 of seaweed near the power station were added from April 20, 2022. As of June 26, 2024, no significant variation had been detected.
  - Regarding sea-area monitoring conducted by TEPCO at 4 points within 3 km from the power station, quick measurements taken of the tritium concentration in the seawater sampled on June 24 showed concentrations under the detection limit (less than 5.9 – 8.1 Bq/L) at all points, which was below the TEPCO operation indices of 700 Bq/L (discharge suspension level) and 350 Bq/L (investigation level).
  - Regarding sea-area monitoring conducted by TEPCO at 1 point within 10 km square from the power station, quick measurements taken of the tritium concentration in the seawater sampled on June 24 showed concentrations under the detection limit (less than 8.1 Bq/L) at all points, which was below the TEPCO operation indices of 30 Bq/L (discharge suspension level) and 20 Bq/L (investigation level).
  - The quick measurement results obtained by each organization were as follows:  
Ministry of the Environment: The analytical results (obtained via quick measurements) for seawater sampled on May 28 and 30 at 7 points off the coast of Fukushima Prefecture showed tritium concentrations below the lower detection limit (less than 8 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.  
Fisheries Agency: Quick analytical results for tritium in flounder sampled on June 18 showed tritium concentrations below the lower detection limit (approx. less than 8.1 Bq/kg) in all samples.  
Fukushima Prefecture: On June 6, tritium concentrations in seawater at 9 sampling points off the coast of Fukushima Prefecture below the lower detection limit were recorded (less than 3.7 – 4.0 Bq/L) at all sampling points, which would have no adverse impact on human health and the environment.
- **Progress of the rearing test of marine organisms in the Fukushima Daiichi Nuclear Power Station**
- To eliminate concerns and reassure the public, a rearing test for marine organisms (flounder) in seawater with ALPS treated water added and normal seawater for comparison is underway.
  - Regarding the flounder and abalones, in both series of tanks (“normal seawater” and “ALPS treated water diluted with seawater”), no mass death or abnormality was detected (as of June 20).
  - Rearing of flounder and others in diluted ALPS treated water (less than 1,500 Bq/L) will continue.
  - The Organically Bound Tritium (OBT) concentration test on flounder (less than 1,500 Bq/L) will continue.
- **Progress of countermeasures related to water leakage including radioactive materials from the High Temperature Incinerator Building**
- As countermeasures based on the water leakage including radioactive materials from the High Temperature Incinerator Building, management measures of TEPCO commenced sequentially from February 13 and are being implemented.
  - On February 21, the Minister of Economy, Trade and Industry instructed TEPCO that as well as addressing simple individual human errors (HEs), TEPCO must also take them as management issues, implement measures to further improve safety and conduct the following two points while incorporating examples in other industries and opinions of external experts. At present, an in-depth study of background courses is being conducted and parts potentially triggering errors are being identified.
    - Thoroughly analyzing any common factors that generate human errors leading to high radiation risks
    - Investing the introduction of hardware and systems using DX without hesitation
  - Currently, facilities and procedures are being inspected to ensure that they are appropriate for the present environment/risks and guarantee safety. At the same time, software and hardware measurements are being formulated (to be completed around the end of December).
  - For systems that affected highly concentrated liquid radioactive materials and environment, an investigation to verify impact by single HE was conducted. Investigations will continue.
- **Dismantling of horizontal tanks**
- Horizontal tanks were used immediately after the earthquake. With the replacement with vertical welded-joint tanks from the perspective of effectively using the site, horizontal tanks are temporarily being stored at present.

- Dedicated dismantling equipment for horizontal tanks will be installed in the existing warehouse B for periodical inspection materials in mid-July to around the end of September.
- After completing the installation work, dismantling will commence from unused horizontal tanks for which the inside is not contaminated.  
 (Dismantling period: late FY2024 – around the end of FY2026)

#### Fuel removal from the spent fuel pools

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

##### ➤ Main work to remove spent fuel at Unit 1

- At Unit 1 Reactor Building, removal of overflowing rubble from the south side external wall was completed on April 25. No significant variation was confirmed in the dust concentration during removal work.
- Except for the south side and a portion of the west side neighboring the south side, installation of the lower structure was completed. At present, anchor drilling the south side is underway and base plates are being installed sequentially.

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

- Before commencing the Unit 2 fuel removal, shielding has been installed on the top floor of the Reactor Building since last November. Concrete placement was completed on March 18, followed by the installation of partition shielding on April 2, whereupon all the work to install the shielding was completed.
- Within the site, installation of a steel gantry frame for fuel removal was completed on June 7. At present, work to install roof panels is underway.
- Outside the site, ground assembly to install a runway garter is underway.

#### Retrieval of fuel debris

##### ➤ Unit 1 Investigation inside the PCV (aerial survey)

- An investigation by a small drone and other equipment was conducted from February to March, focusing on the area in the Reactor Building 1st floor (within and outside the pedestal).
- Images acquired during the investigation will be converted to a 3D model to be utilized when checking interference with future fuel debris retrieval and investigations inside the PCV, examining equipment and others.
- Assuming that the air dose is proportional to the noise level of images based on the results of the radiation resistance test, a dose evaluation was conducted using the drone images taken. In the next phase, a detailed investigation into the dose source will be conducted by a drone mounting a dosimeter.

##### ➤ Unit 3 Results of investigation inside the Reactor Building

- An investigation in the area southwest of the Unit 3 Reactor Building was conducted from April 16 to June 14.
- Using a remote-control robot, images, point cloud and dose rate data were acquired. It was confirmed that areas around the debris near the floor were the main dose source on the 2nd and 4th floors of the Reactor Building.
- In the next phase, information acquired will be used to identify the dose source parts in the area and estimate the dose rate distribution. The information will be utilized to examine future decommissioning work and formulate investigative plans for other areas.

##### ➤ Units 1 and 2 Transfer of pipes for work to remove SGTS pipes

- Among pipes of Units 1 and 2 Standby Gas Treatment System (SGTS), the Unit 2 SGTS pipes for which removal was completed are temporarily stored on the rooftop of the Unit 1 Control Building.
- Since these pipes interfere with work to install the Unit 1 large cover, they will be transferred to a yard on the west side of the High Temperature and High-Pressure Incinerator to minimize such interference.

##### ➤ Units 3 and 4 Investigation of the radiation dose before removing the main exhaust stack

- Before dismantling the exhaust stack for Units 3 and 4, the radiation dose inside and outside the exhaust stack was investigated.
- It was confirmed, both inside and outside the shaft, that the radiation dose toward the upper part of the shaft was declining. Moreover, based on the investigation inside the shaft, steel materials, which were not detected on the drawing, were confirmed around approx. 64m from the ground, but were not considered to impact on the work to remove the exhaust stack.

- Based on the investigative results, the construction method will be examined to dismantle the exhaust stack after FY2026.
- **Unit 3 Sampling of HCU inclusive water**
  - The air doses on the north and south sides of the Unit 3 Reactor Building 1st floor and the Hydraulic Control Unit\* (HCU) were identified as high-dose sources. Work related to sampling of HCU-inclusive water is planned.
  - \* A unit that supplies and controls high-pressure water to the Control Rod Drive installed at the bottom of the reactor.
  - Six HCUs are selected for sampling, with accessibility, operability and the radiation dose in mind.
  - Based on the sampling and analytic results, methods to reduce the HCU radiation 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 rubble and trimmed trees**
  - As of the end of May 2024, the total storage volume for concrete and metal rubble was approx. 400,700 m<sup>3</sup> (+100 m<sup>3</sup> compared to the end of April with an area-occupation rate of 79%). The total storage volume of trimmed trees was approx. 80,200 m<sup>3</sup> (+600m<sup>3</sup>, with an area-occupation rate of 46%). The total storage volume of used protective clothing was approx. 15,000 m<sup>3</sup> (-2,600 m<sup>3</sup>, with an area-occupation rate of 59%). The total storage volume of radioactive solid waste (incinerated ash and others) was approx. 38,300 m<sup>3</sup> (a slight increase, with an area-occupation rate of 60%). The increase in rubble was attributable to work related to the area around the Units 1-4 buildings and work related to site preparation.
- **Management status of secondary waste from water treatment**
  - As of June 6, 2024, the total storage volume of waste sludge was 423 m<sup>3</sup> (area-occupation rate: 60%), while that of concentrated waste fluid was 9,500 m<sup>3</sup> (area-occupation rate: 92%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal equipment and others, was 5,770 (area-occupation rate: 86%).

#### Reactor cooling

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

- **Status of Unit 1 Primary Containment Vessel (PCV) water level reduction**
  - For Unit 1, due to the high water level in the PCV Suppression Chamber (S/C), a gradual water level reduction was planned with the need to improve seismic resistance in mind.
  - The PCV water level reached the first and second hold points (HP (1) and (2)) on April 11 and May 25 respectively. After inspecting the impact of PCV water level reduction, it was determined that water level reduction could continue. Accordingly, water level reduction to HP (3) commenced from June 13.

#### Reduction in radiation dose and mitigation of contamination

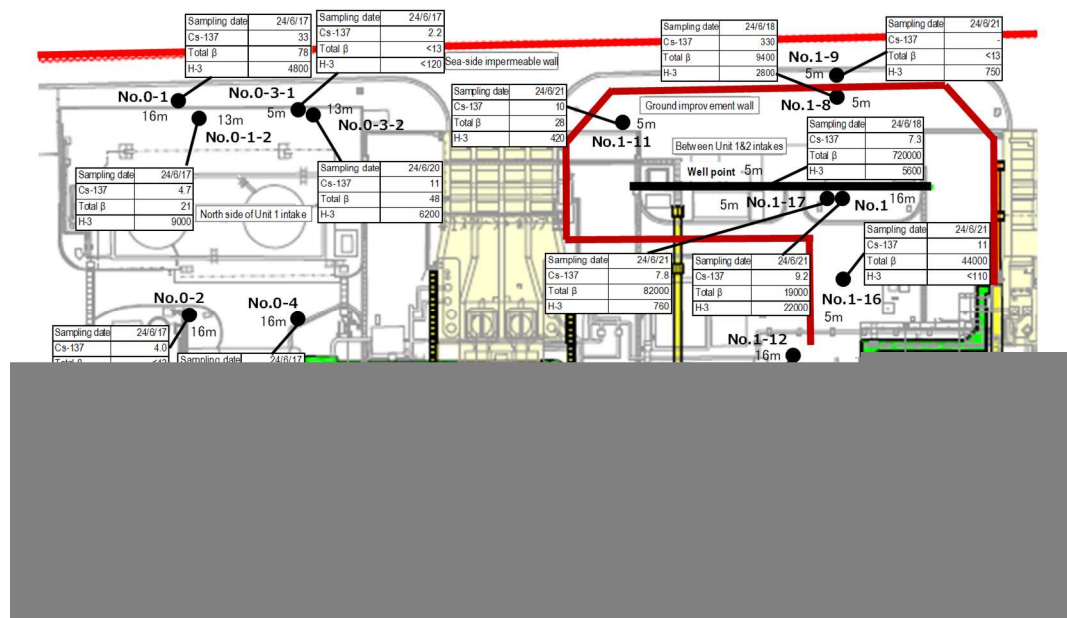
*Effective dose-reduction at site boundaries and purification of port water to mitigate the impact of radiation on the external environment*

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

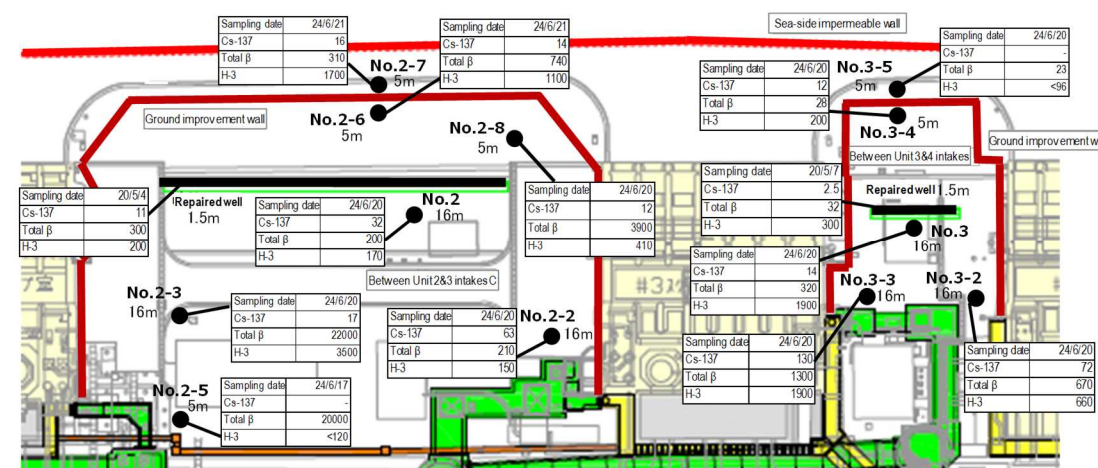
trend continues to be carefully monitored.

- In the area between the Unit 2 and 3 intakes, the H-3 concentration has been below the legal discharge limit of 60,000 Bq/L at all observation holes. It has remained constant or been declining at many observation holes overall. The concentration of total  $\beta$  radioactive materials has remained constant overall but has been increasing 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  $\beta$  radioactive materials has remained constant overall but has been increasing or declining at Nos. 3-4 and 3-5. The trend continues to be carefully monitored.
- In the groundwater on the east side of the Turbine Buildings, as with the total  $\beta$  radioactive materials, the concentration of cesium has also remained constant as the overall area but been increasing or declining at observation holes with low concentration and exceeded the previous highest record at some observation holes. Investigations will continue, including to ascertain the impact of rainfall.
- The concentration of radioactive materials in drainage channels has remained constant overall, despite increasing during rainfall. In Drainage Channel D, drainage of the low-dose area on the west side of the site started to pass from August 30, 2022. It has remained low, despite concentrations of cesium and total  $\beta$  radioactive materials increasing during rainfall. From November 29, 2022, continuous monitors were installed and drainage around the Units 1 and 2 switch yard started to pass.
- In the open channel area of the seawater intake for Units 1 to 4, the concentration of radioactive materials in seawater has remained below the legal discharge limit and been declining long term, despite the temporary increases in Cs-137 and Sr-90 observed during rainfall. They have also been declining following the completed installation and the connection of steel pipe sheet piles for the sea-side impermeable walls. The concentration of Cs-137 remained slightly higher in front of the south-side impermeable walls and slightly lower on the north side of the east breakwater since March 20, 2019, when the silt fence was transferred to the center of the open channel due to mega float-related construction.
- In the port area, the concentration of radioactive materials in seawater has remained below the legal discharge limit and has 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. During the period of discharge of ALPS treated water, the tritium concentration increased at the sampling point near the discharge outlet, but this was considered within the assumed range based on the results of the oceanic dispersion simulation.





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



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

Figure 4: Groundwater concentration on the Turbine Building east side

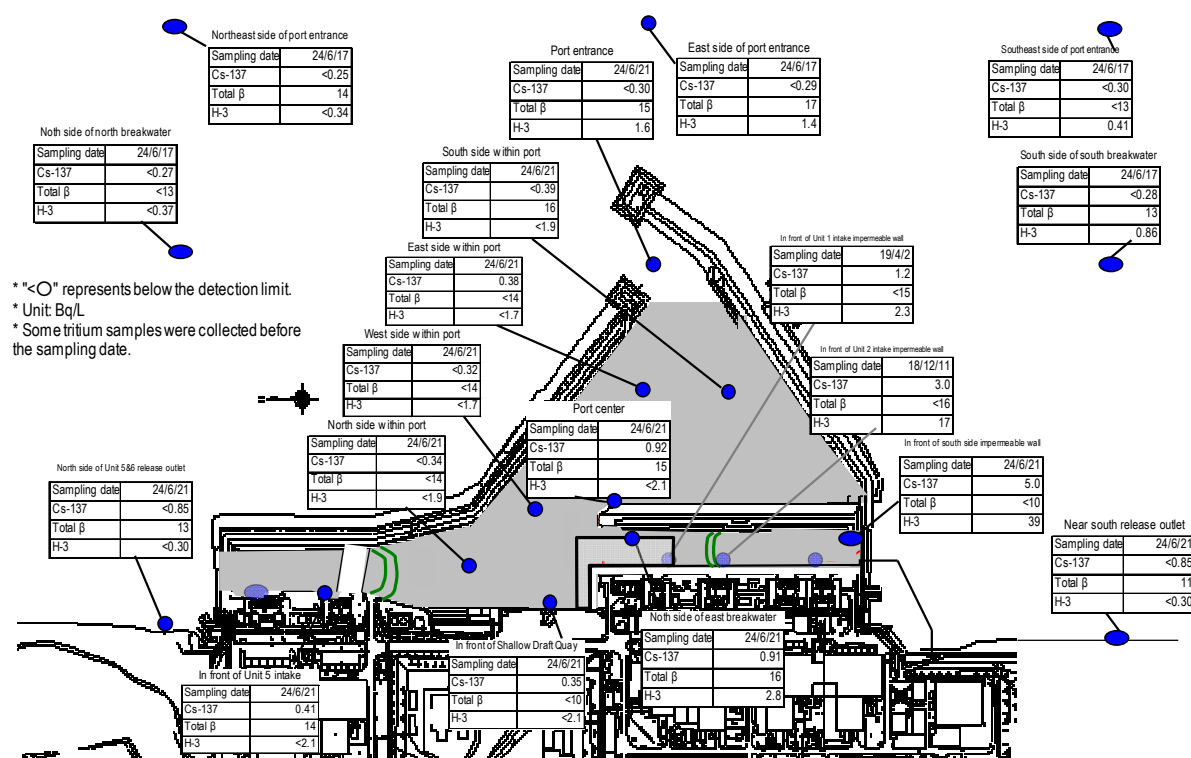


Figure 5: Seawater concentration around the port

## Outlook of the number of staff required and efforts to improve the labor environment and conditions

*Adequate number of staff will be secured in the long-term, while firmly implementing radiation control of workers. The work environment and labor conditions will be continuously improved by responding to the needs on the site.*

### Staff management

- The monthly average total of personnel registered for at least one day per month to work on site during the past quarter from February to April 2024 was approx. 9,100 (cooperating company workers and TEPCO HD employees), which exceeded the monthly average workforce (approx. 7,800). Accordingly, sufficient personnel were registered to work on site.
- It was confirmed with the prime contractors that the estimated manpower necessary for the work in July 2024 (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, at approx. 3,500 to 4,700.
- The number of workers from within Fukushima Prefecture remained constant and that from outside increased slightly. As of May 2024, the local employment ratio (cooperating company workers and TEPCO HD employees) remained constant at around 70%.
- The average exposure doses of workers were approx. 2.51, 2.16 and 2.18 mSv/person-year during FY2021 2022 and 2023, respectively (The legal exposure dose limits are 100 and 50 mSv/person-year respectively over five years, the TEPCO HD management target is 20 mSv/person-year).
- For most workers, the exposure dose remained sufficiently within the limit and allowed them to continue engaging in radiation work.

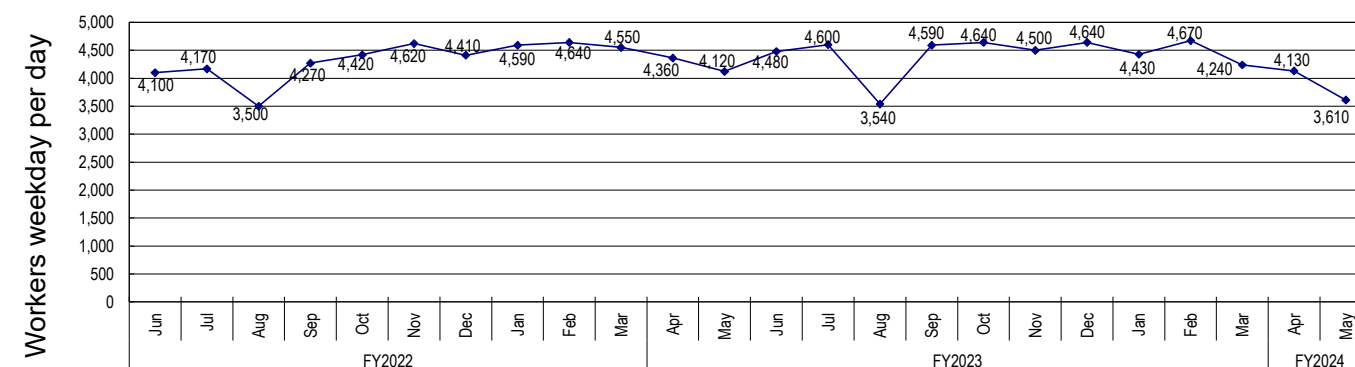


Figure 6: Changes in the average number of workers weekday per day for each month of the most recent 2 years (actual values)

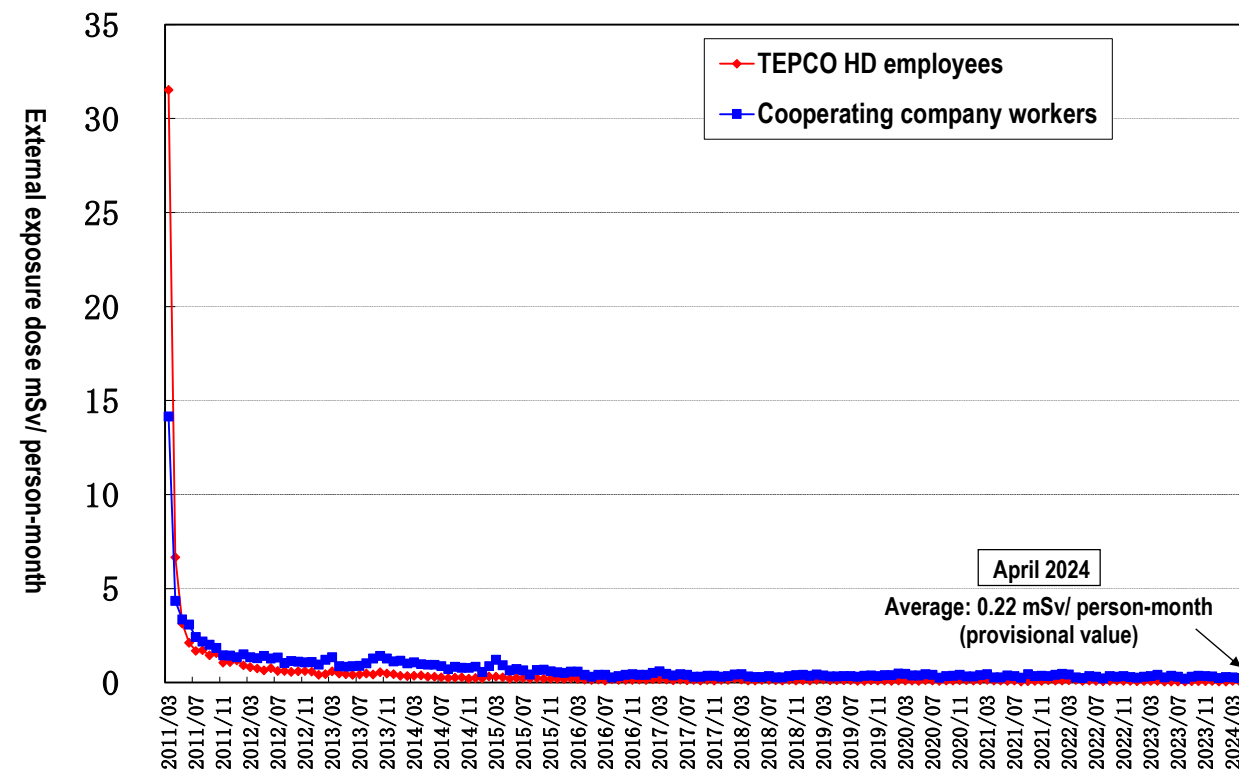


Figure 7: Changes in monthly average exposure dose of individual worker  
(monthly exposure dose since March 2011)

#### ➤ Status of heat stroke cases

- In FY2024, measures to further prevent heat stroke commenced from April to cope with the hottest season.
- In FY2024, two workers suffered heat stroke due to work up until June 24 (in FY2023, one worker up until the end of June). An environment encouraging workers to report any feelings of illness will continue to be created and countermeasures will be taken to prevent heat stroke.

#### ➤ Countermeasures for infectious diseases

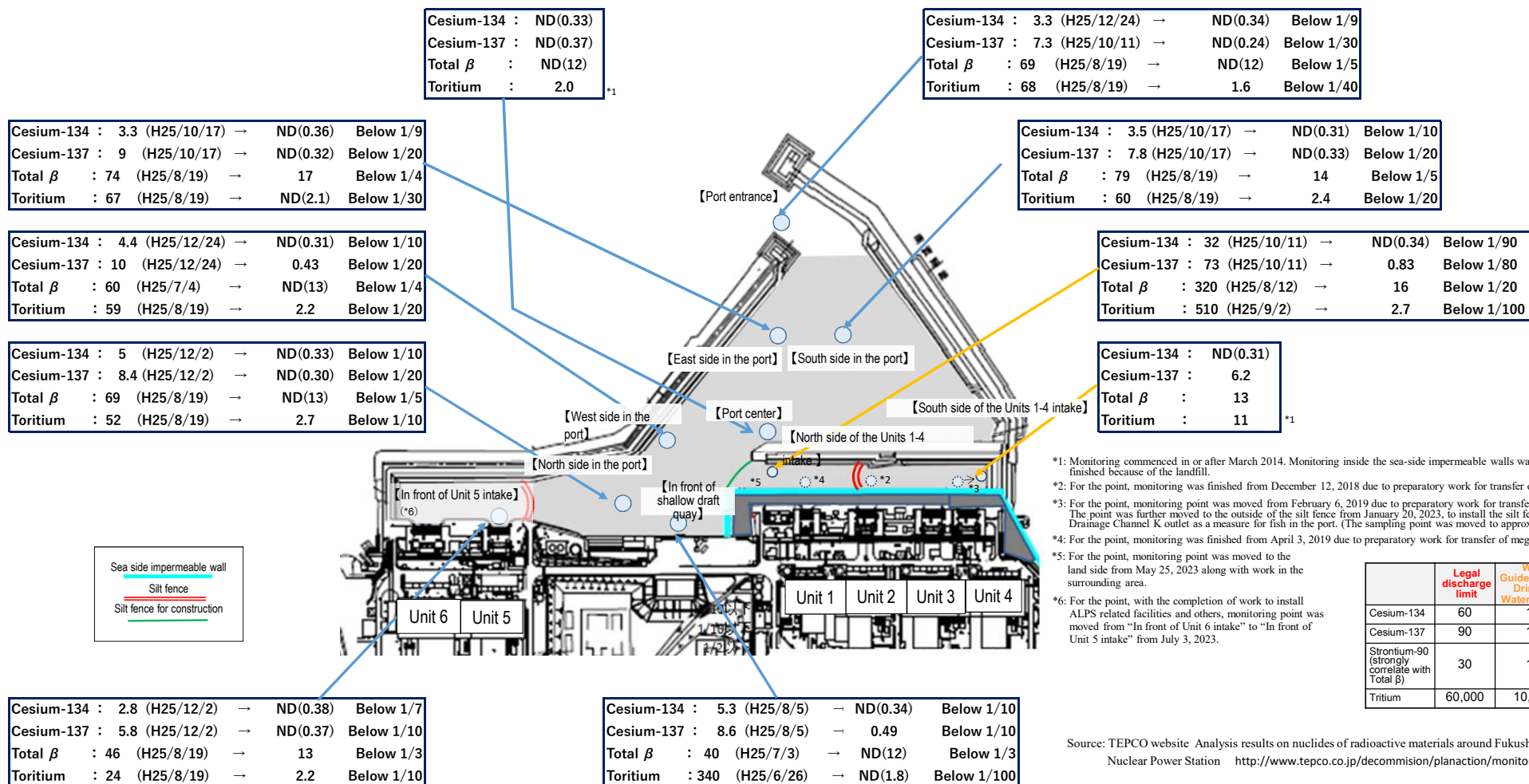
- Countermeasures for various infectious diseases (influenza, norovirus, COVID-19, etc.) depend on personal decisions and basic countermeasures (visiting medical institutions when feeling unwell, ventilation, avoidance of the “Three Cs,” frequent handwashing, etc.) being implemented appropriately by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

## 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 May 28 - June 24)"; unit (Bq/L); ND represents a value below the detection limit

Note: The Total  $\beta$  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 June 25, 2024





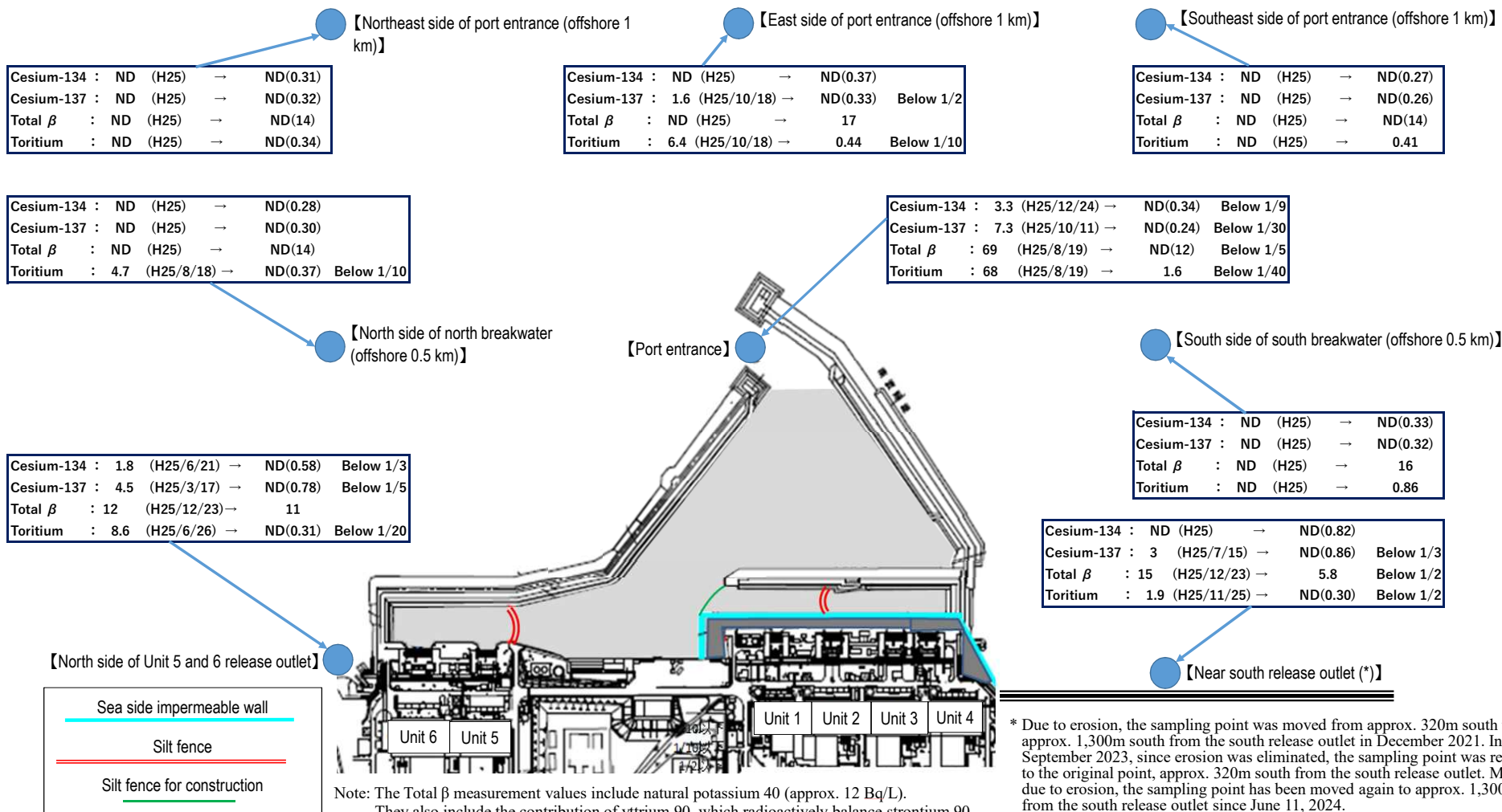
## Status of seawater monitoring around outside of the port (comparison between the highest values in 2013 and the latest values)

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 May 28 - June 24)

Summary of TEPCO data as of June 25, 2024

	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



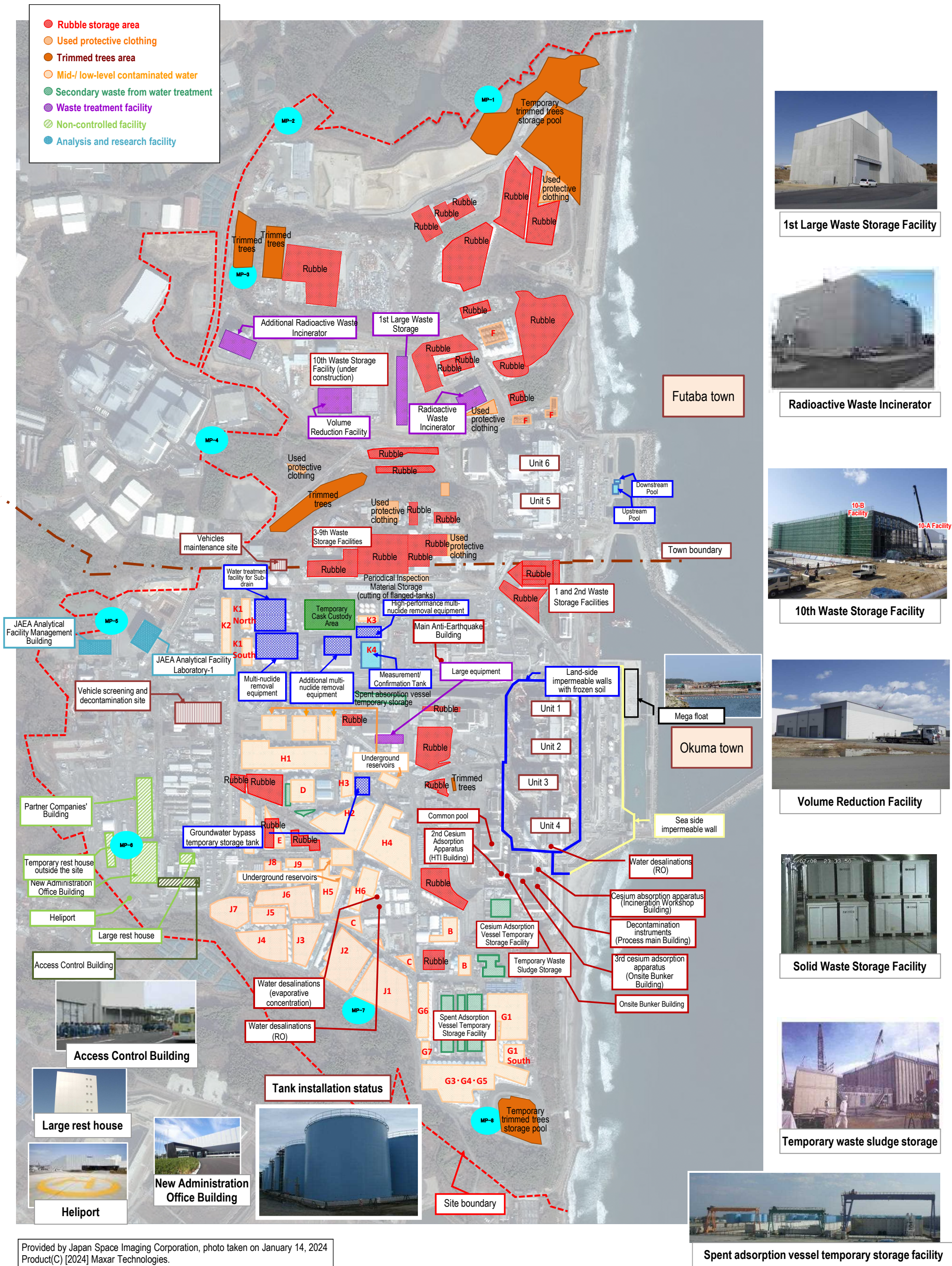
\* Due to erosion, the sampling point was moved from approx. 320m south to approx. 1,300m south from the south release outlet in December 2021. In September 2023, since erosion was eliminated, the sampling point was returned to the original point, approx. 320m south from the south release outlet. Moreover, due to erosion, the sampling point has been moved again to approx. 1,300m south from the south release outlet since June 11, 2024.

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



# TEPCO Holdings Fukushima Daiichi Nuclear Power Station Site Layout

Appendix 2  
June 27, 2024



Provided by Japan Space Imaging Corporation, photo taken on January 14, 2024  
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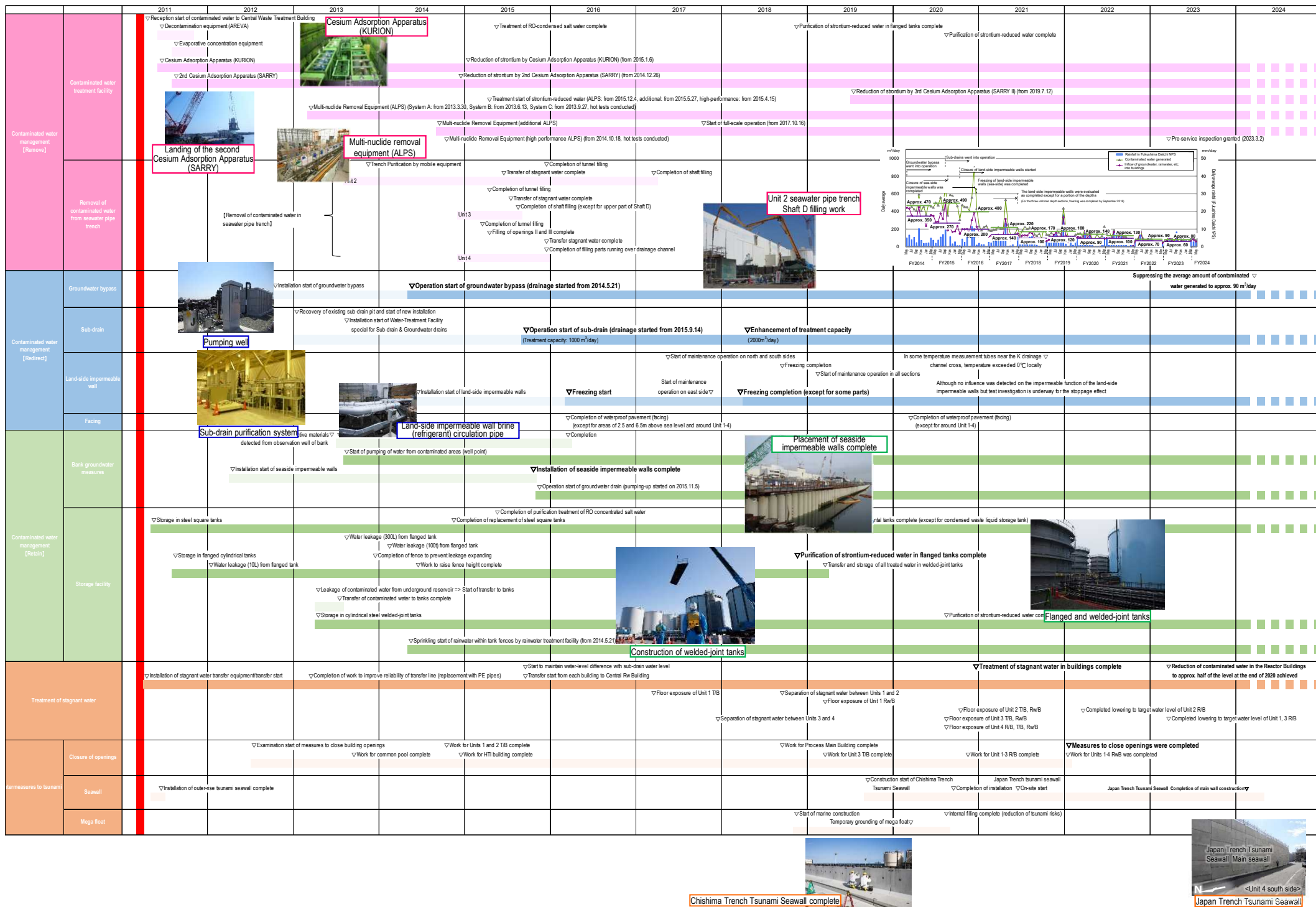


# 1 Contaminated water management

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

- [Completed] Suppressing the amount of contaminated water generated to 150 m<sup>3</sup>/day or less (within 2020)
- [Completed] Suppressing the amount of contaminated water generated to 100 m<sup>3</sup>/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)

Reference 1/6  
June 27, 2024  
Secretariat of the Team for  
Countermeasures for Decommissioning,  
Contaminated Water and Treated Water



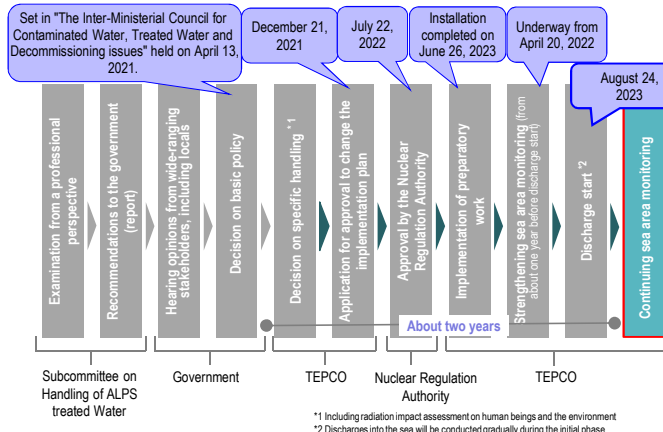


## 2 Handling of ALPS treated water

Reference 2/6  
June 27, 2024  
Secretariat of the Team for  
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Contaminated Water and Treated Water

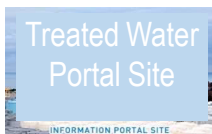
In "The Inter-Ministerial Council for Contaminated Water, Treated water and Decommissioning" held on April 13, the basic policy on how to handle ALPS treated water was set. Based on this, the response of TEPCO was announced on April 16.

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

- Occasions to deepen the understanding are organized by communications related to decommission via various media and visit to the power station.



- On the dedicated website "Treated Water Portal Site" (Japanese, English, Chinese and Korean) within the TEPCO website, monitoring results of radioactive materials are published timely.



Dialogue meeting

- Visit and dialogue meeting of Fukushima Daiichi Nuclear Power Station have been held since 2019 for 13 cities, towns and villages.



- Through various opportunities such as visit and on-site explanations, communications continue where opinions of related parties are heard, their thought is taken seriously, and TEPCO conveys its efforts, thought and countermeasures for reputational damage.

### 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

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)  
2023.7.7 Receipt of Certificate of Completion for Pre-survey Inspections  
2023.6.26 Completion of installation

2023.8.24 Commencement of discharge

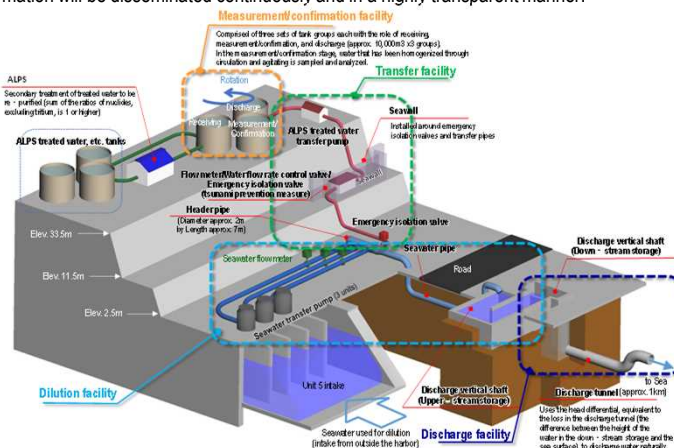
### ● Status of discharge of ALPS treated water into the sea

Discharge of ALPS treated water into the sea commenced from August 24, 2023, and the 1st discharge was completed on September 11.

During the discharge period, no abnormality was detected by the sea area monitoring conducted by the national government, Fukushima Prefecture and TEPCO.

<Discharges in FY2023>

Tank group discharged	Tank Group C	Tank Group A
Tritium concentration	190,000 Bq/L	170,000 Bq/L
Discharge commencement	April 19, 2023	May 17, 2024
Discharge termination	May 7, 2023	June 4, 2024
Discharge amount	7,851 m <sup>3</sup>	7,892 m <sup>3</sup>
Total tritium amount	1.5 trillion Bq	1.3 trillion Bq



### ● Rearing test of marine organisms

- To alleviate concerns and lead to relief of local residents, related parties and the everyone in society, marine organisms are being reared in tanks of seawater containing ALPS treated water and the status is compared with the original seawater controls.
- External experts also confirmed that there was no difference in rearing statuses between the tanks of the original seawater controls and those of seawater containing ALPS treated water.
- As shown in the existing research results conducted in Japan and overseas, it was confirmed that "tritium in vivo reached equilibrium in a certain time period and the concentration of tritium in vivo reaching equilibrium did not exceed the level in the growing environment."



Flounder in rearing preparation tank



Overall view of mockup tanks

- Daily rearing status is published in the TEPCO website and Twitter
  - TEPCO website: <http://www.tepco.co.jp/decommission/information/newsrelease/readingtest/index-j.html>
  - TEPCO X (Old Twitter): <https://twitter.com/TEPCOfishkeeper>



### ● Publication of the Comprehensive Report of the IAEA safety review

The Comprehensive Report on the safety review concerning handling of ALPS-treated water was published by the IAEA on July 4, 2023.

In the Executive Summary of the IAEA Comprehensive Report, the IAEA concluded the following: (1) the activities by Japan associated with the discharge of ALPS treated water into the sea are consistent with relevant international safety standards, (2) the discharge of the ALPS treated water will have a negligible radiological impact on people and the environment.

We will continue to share necessary information with the IAEA, while striving to foster further understanding of the international community about the discharge of ALPS treated water into the sea.

<https://www.iaea.org/topics/response/fukushima-daiichi-alps-treated-water-discharge-comprehensive-reports>

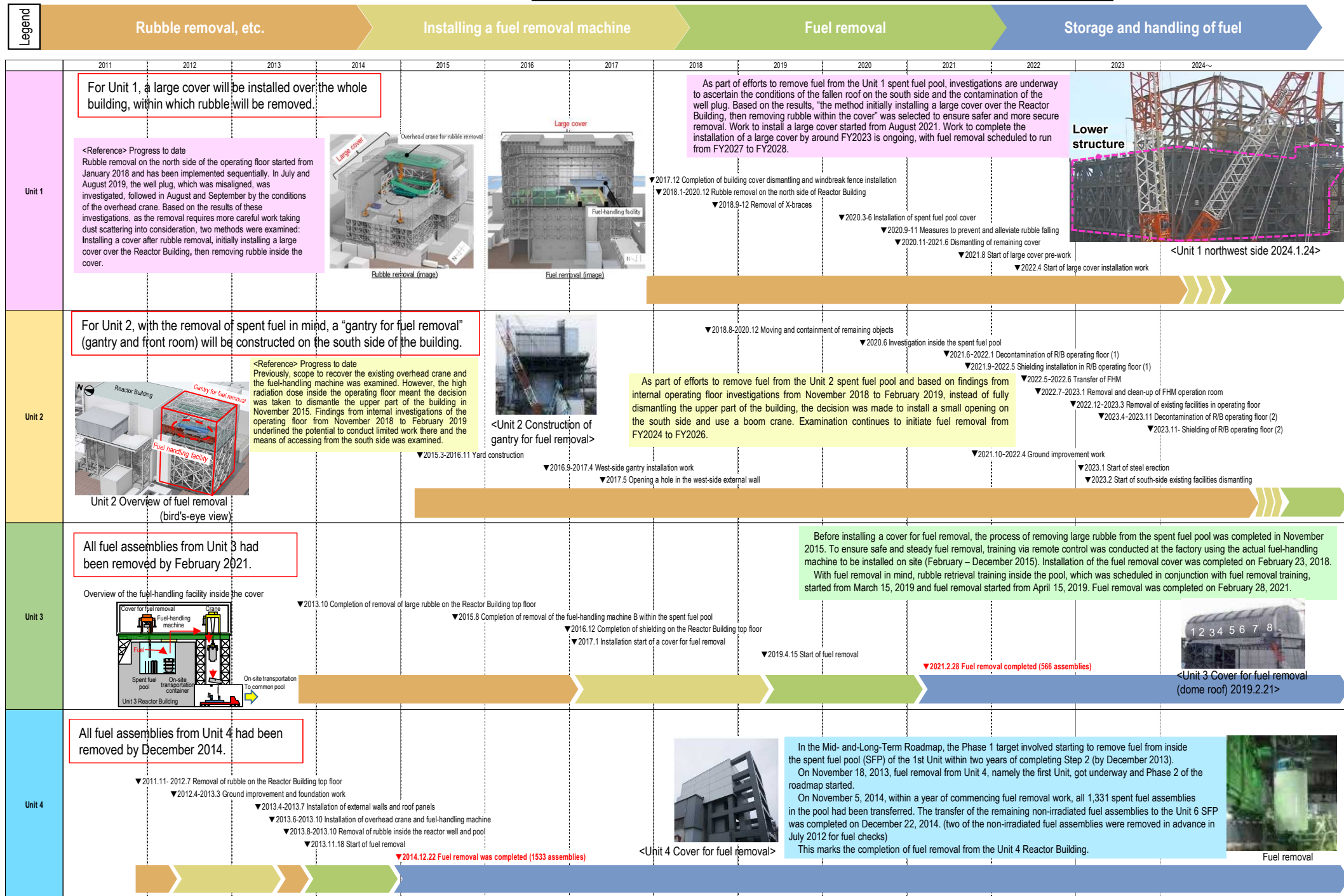


### 3 Removal of fuel from spent pool

Milestones of 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 3/6  
June 27, 2024  
Secretariat of the Team for  
Countermeasures for Decommissioning,  
Contaminated Water and Treated Water





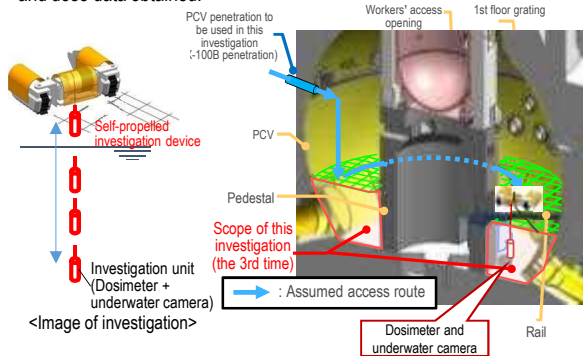
## Milestones of the Mid- and Long-Term Roadmap (major target processes)

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)

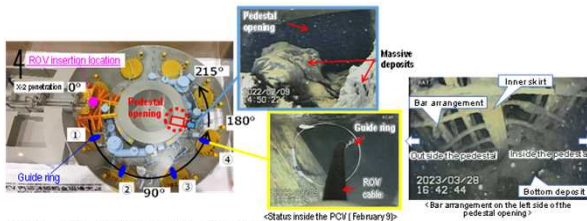
Before removing fuel debris, investigations inside the Primary Containment Vessel (PCV) are conducted to inspect the conditions there, including locations of fuel debris.

## Unit 1 Investigation overview

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



## Unit 1 PCV internal investigation

Investigations inside the PCV	1st (2012.10)	<ul style="list-style-type: none"><li>- Acquiring images</li><li>- Measuring the air temperature and dose rate</li><li>- Measuring the water level and temperature</li><li>- Sampling stagnant water</li><li>- Installing permanent monitoring instrumentation</li></ul>
	2nd (2015.4)	<ul style="list-style-type: none"><li>- Confirming the status of the PCV 1st floor</li><li>- Acquiring images</li><li>- Measuring the air temperature and dose rate</li><li>- Replacing permanent monitoring instrumentation</li></ul>
	3rd (2017.3)	<ul style="list-style-type: none"><li>- Confirming the status of the PCV 1st basement floor</li><li>- Acquiring images</li><li>- Measuring the dose rate</li><li>- Sampling deposit</li><li>- Replacing permanent monitoring instrumentation</li></ul>
	4th (From 2022.2)	<ul style="list-style-type: none"><li>- Acquiring information inside PCV (inside/outside of the pedestal)</li><li>- Acquiring images</li><li>- Measuring deposit thickness and sampling deposit</li><li>- Detecting deposit debris, 3D mapping</li></ul>
Leakage points from PCV	<ul style="list-style-type: none"><li>- PCV vent pipe vacuum break line bellows (identified in 2014.5)</li><li>- Sand cushion drain line (identified in 2013.11)</li></ul>	
<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)		

## 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.



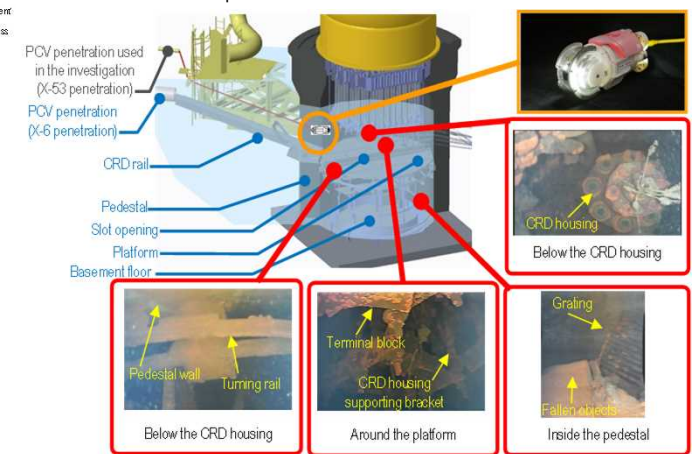
## Unit 2 PCV internal investigation

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.

## &lt;Conditions inside the pedestal&gt;



## Unit 3 PCV internal investigation

Investigations inside the PCV	1st (2015.10-12)	<ul style="list-style-type: none"><li>- Acquiring images</li><li>- Measuring the air temperature and dose rate</li><li>- Measuring the water level and temperature</li><li>- Sampling stagnant water</li><li>- Installing permanent monitoring instrumentation (2015.12)</li></ul>
	2nd (2017.7)	<ul style="list-style-type: none"><li>- Acquiring images</li><li>- Installing permanent monitoring instrumentation (2017.8)</li></ul>
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)		



## 5 Management of solid radioactive waste

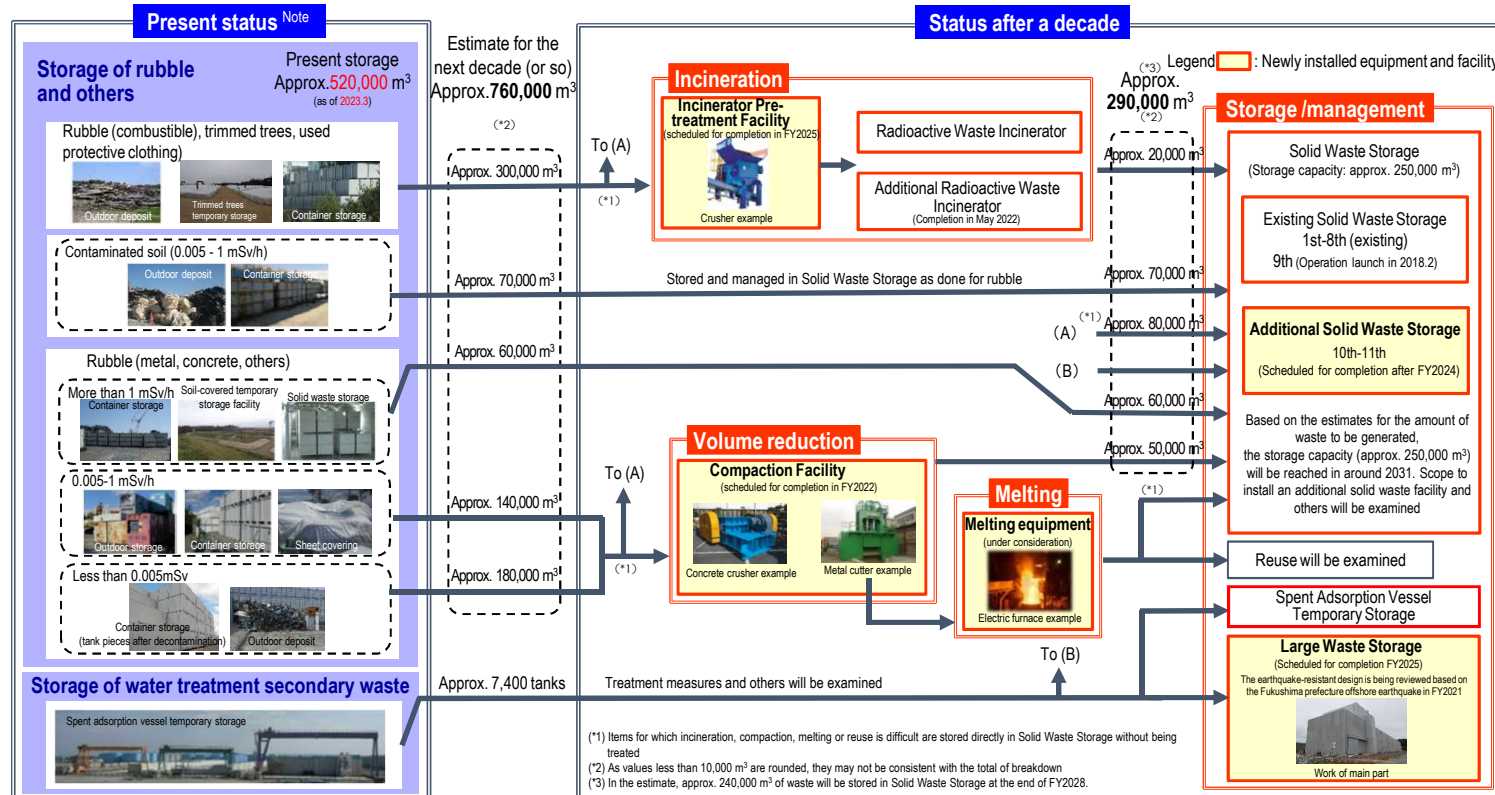
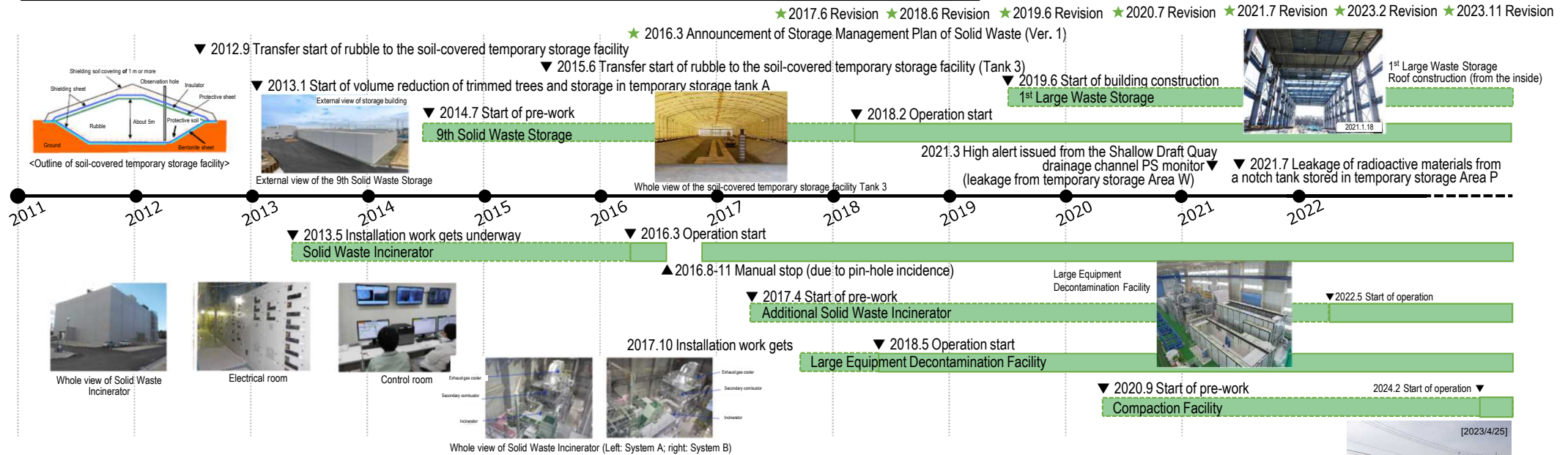
Reference 5/6

June 27, 2024

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

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)

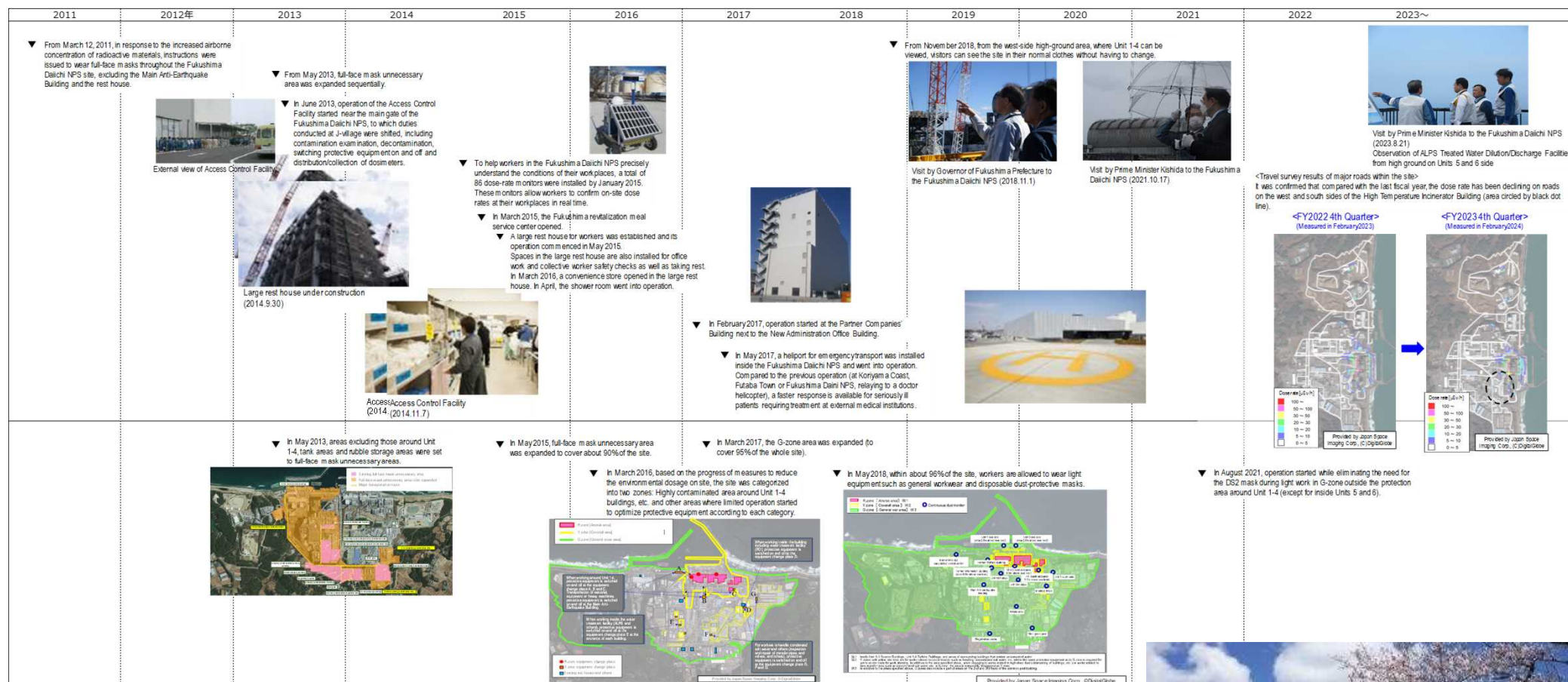


Note: Used protective clothing before incineration and BG-level concrete waste for which treatment and reuse is decided at present are not included.

- 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.

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.



Move in general working clothes  
(2016.1.7)



Facing  
(2017.4.13)

