Summary of Decommissioning and Contaminated Water Management

January 28, 2016

Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

Main works and steps for decommissioning

Fuel removal from Unit 4 SFP had been completed and preparatory works to remove fuel from Unit 1-3 SFP and fuel debris (Note 1) removal are ongoing.

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

Fuel Removal from SFP

(Units 1&2) Rubble removal & dose reduction → (Unit 3) Installing a Fuel-Handling Machine → Fuel removal → (Unit 4) Storage and handling

Unit 1: Fuel removal to start in FY2020
Unit 2: Fuel removal to start in FY2020
Unit 3: Fuel removal to start in FY2017
Unit 4: Fuel removal completed in 2014

Fuel Debris Removal

(Unit 1-3) Capturing the status inside PCV/ examination of fuel debris removal method, etc. (Note 2) → Fuel debris removal → Storage and handling

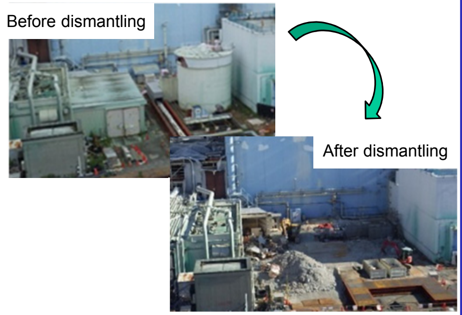
(Note 2)
The fuel debris removal method for each unit will be decided two years after revising the Mid-and-Long-term road map (June 2015). The method for the first unit will be confirmed in the first half of FY2018.

Dismantling Facilities

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

Toward fuel removal from pool

Toward fuel removal from Unit 2 SFP, preparation around the building is underway.
Dismantling of hindrance buildings around the Reactor Building has been underway since September 2015 to clear a work area to install large heavy-duty machines, etc.



(Preparation around Unit 2 Reactor Building)

Three principles behind contaminated water countermeasures

Countermeasures for contaminated water are implemented in accordance with the following three principles:

1. Eliminate contamination sources

① Multi-nuclide removal equipment, etc.
② Remove contaminated water in the trench (Note 3)

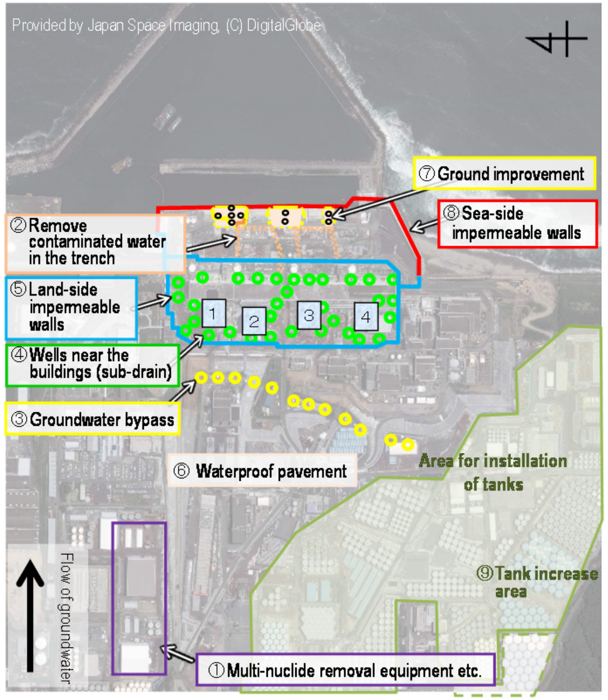
(Note 3) Underground tunnel containing pipes.

2. Isolate water from contamination

③ Pump up groundwater for bypassing
④ Pump up groundwater near buildings
⑤ Land-side impermeable walls
⑥ Waterproof pavement

3. Prevent leakage of contaminated water

⑦ Soil improvement by sodium silicate
⑧ Sea-side impermeable walls
⑨ Increase tanks (welded-joint tanks)



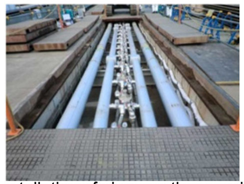
Multi-nuclide removal equipment (ALPS), etc.

- This equipment removes radionuclides from the contaminated water in tanks and reduces risks.
- Treatment of contaminated water (RO concentrated salt water) was completed in May 2015 via multi-nuclide removal equipment, additional multi-nuclide removal equipment installed by TEPCO (operation commenced in September 2014) and a subsidy project of the Japanese Government (operation commenced in October 2014).
- Strontium-treated water from equipment other than ALPS is being re-treated in ALPS.


(High-performance multi-nuclide removal equipment)

Land-side impermeable walls

- Land-side impermeable walls surround the buildings and reduce groundwater inflow into the same.
- Onsite tests have been conducted since August 2013. Construction work commenced in June 2014.
- Freezing functioning test commenced at the end of April 2015.
- Construction on the mountain side was completed in September 2015.
- Construction on the sea side will be completed in February 2016.


(Installation of pipes on the sea side for land-side impermeable walls)

Sea-side impermeable walls

- Impermeable walls are being installed on the sea side of Units 1-4, to prevent the flow of contaminated groundwater into the sea.
- The installation of steel pipe sheet piles was completed in September 2015 and they were connected in October 2015. These works completed the closure of sea-side impermeable walls.


(Installation status)

Progress status

◆ The temperatures of the Reactor Pressure Vessel (RPV) and the Primary Containment Vessel (PCV) of Units 1-3 have been maintained within the range of approx. 15-30°C[*1] for the past month. There was no significant change in the density of radioactive materials newly released from Reactor Buildings in the air[*2]. It was evaluated that the comprehensive cold shutdown condition had been maintained.

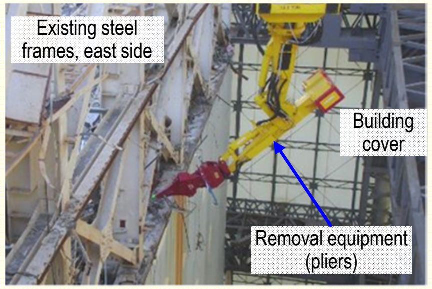
* 1 The values vary somewhat depending on the unit and location of the thermometer.

* 2 In December 2015, the radiation exposure dose due to the release of radioactive materials from the Unit 1-4 Reactor Buildings was evaluated as less than 0.0015 mSv/year at the site boundaries. The annual radiation dose by natural radiation is approx. 2.1 mSv/year (average in Japan).

Status of Unit 1 Reactor Building cover dismantling

To facilitate rubble removal from the top floor of Unit 1 Reactor Building, sprinklers will be installed as measures to prevent dust scattering.

Removal of steel frames which would hinder the installation has been underway since January 8, 2016. Following the removal, works such as installation of sprinklers will start carefully based on the investigative results of rubble on the top floor.

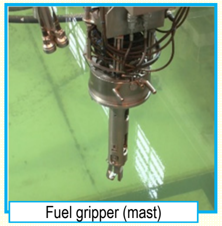


<Removal of hindering steel frames>

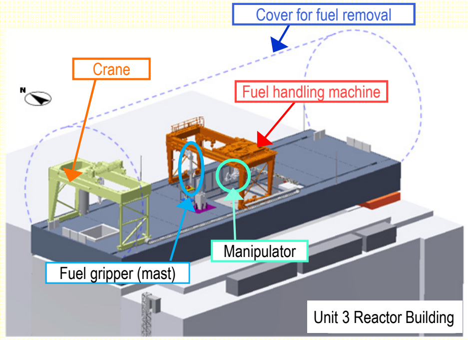
To facilitate fuel removal from Unit 3 spent fuel pool

To ensure safe and steady fuel removal from Unit 3 spent fuel pool, training of remote control was conducted at the factory using the actual fuel-handling machine which will be installed on site.

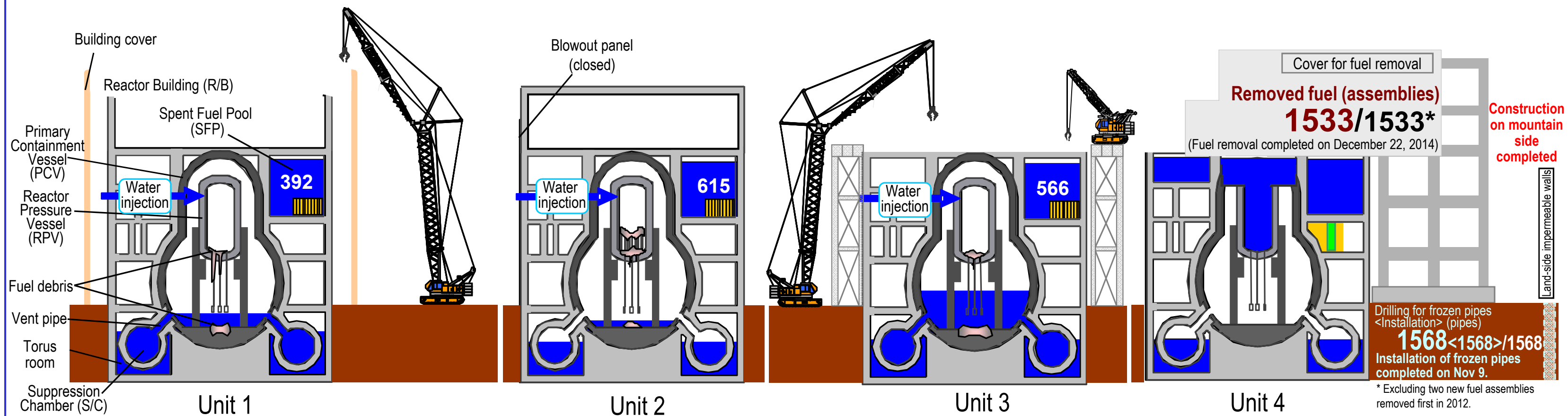
To facilitate installation of the cover for fuel removal and the fuel-handling machine, decontamination and shielding will follow on the top floor of the Reactor Building.



<Fuel-handling facility (in the factory)>



<Image of entire fuel handling facility>



Sea-side construction of land-side impermeable walls completed

Construction was completed by September 2015 for three mountain sides of the land-side impermeable walls.

On the sea side, construction will be completed in early February 2016 including filling of brine into pipes.

This work will complete preparation for freezing of land-side impermeable walls including sea side.

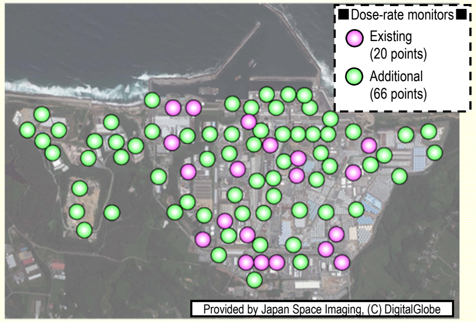
Additional installation of dose-rate monitors

To help workers in the Fukushima Daiichi Nuclear Power Station precisely understand the conditions of their workplaces, a total of 86 dose-rate monitors were installed by January 4, 2016.

These monitors allow workers to confirm real time on-site dose rates at their workplaces.

Workers are also able to check concentrated data through large-scale displays installed in the Main Anti-Earthquake Building and the access control facility.

< Installation of Dose-rate monitor >

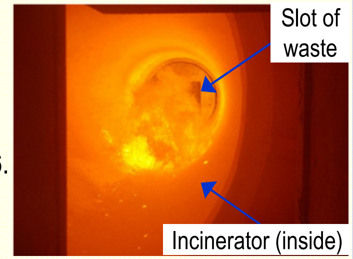


<Locations of dose-rate monitors>

Hot test will start at Radioactive Waste Incinerator

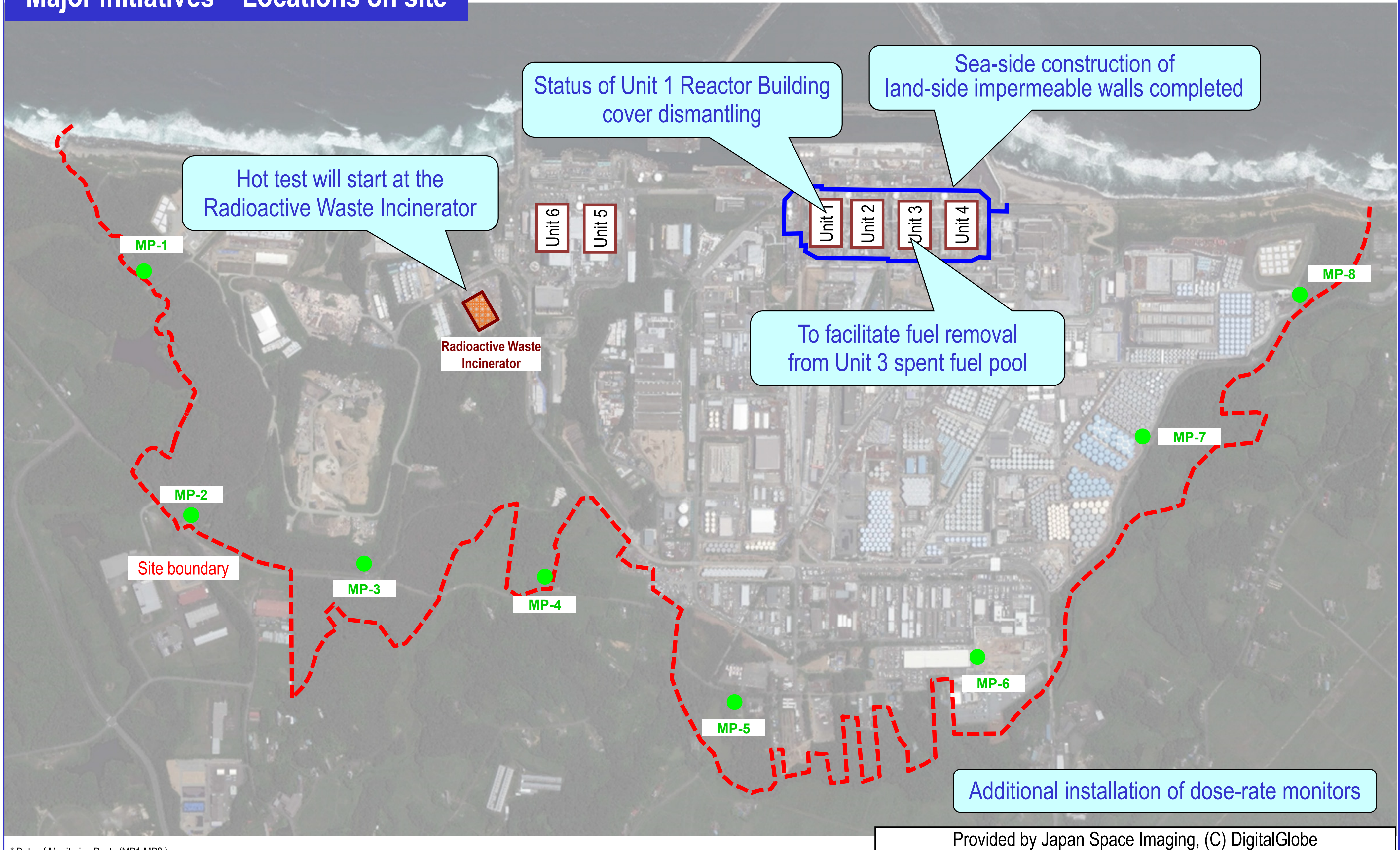
To facilitate operation start of the Radioactive Waste Incinerator which will incinerate used protective clothing and other radioactive waste temporarily stored on site, a cold test incinerating dummy waste was completed on January 22, 2016.

A hot test incinerating actual contaminated waste will be conducted from February. After confirming the functions and performance in the hot test, operation will start within this fiscal year.



< Incineration of dummy waste in Radioactive Waste Incinerator >

Major initiatives – Locations on site



* Data of Monitoring Posts (MP1-MP8.)

Data (10-minute value) of Monitoring Posts (MPs) measuring airborne radiation rate around site boundaries show 0.687 – 3.200 μSv/h (December 22, 2015 – January 26, 2016).

Monitoring posts 1 to 8 are being replaced from December 4, 2015 because they reached the time for replacement. During this work, some data may not be obtained and mobile monitoring posts or other equivalent facilities will be installed as alternatives.

We improved the measurement conditions of monitoring posts 2 to 8 for precise measurement of air dose rate. Construction works such as tree-clearing, surface soil removal and shield wall setting were implemented from Feb .10 to Apr. 18, 2012.

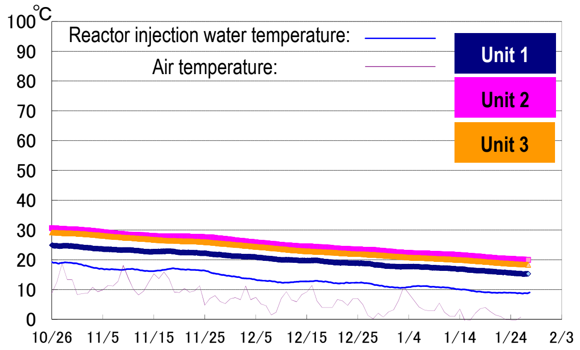
Therefore monitoring results at these points are lower than elsewhere in the power plant site.

The radiation shielding panel around monitoring post No. 6, which is one of the instruments used to measure the radiation dose of the power station site boundary, were taken off from July 10-11, 2013, since the surrounding radiation dose has largely fallen down due to further cutting down of the forests, etc.

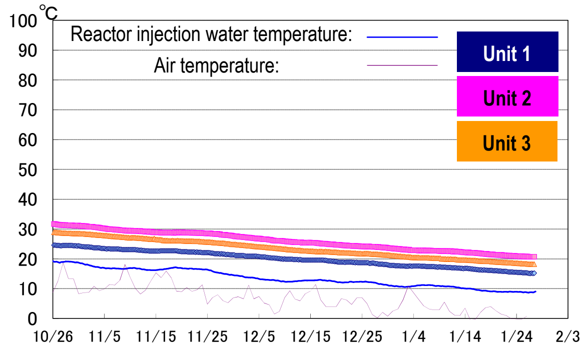
I. Confirmation of the reactor conditions

1. 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 have been maintained within the range of approx. 15 to 30°C for the past month, though they vary depending on the unit and location of the thermometer.



RPV bottom temperatures (recent quarter)



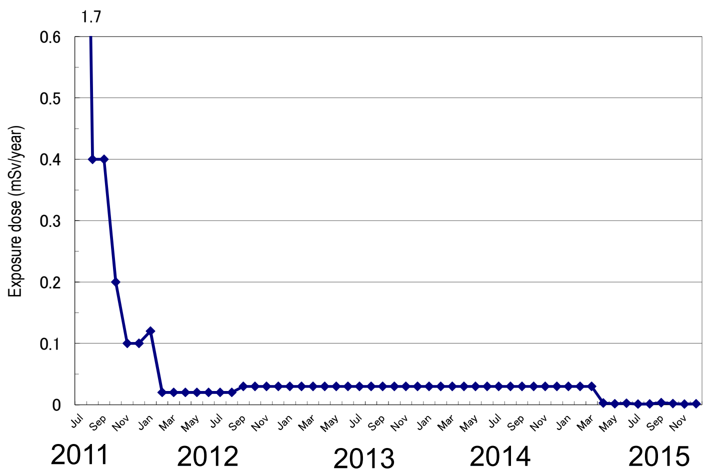
PCV gas phase temperatures (recent quarter)

* The trend graphs show part of the temperature data measured at multiple points.

2. Release of radioactive materials from the Reactor Buildings

As of December 2015, the density of radioactive materials newly released from Reactor Building Units 1-4 in the air and measured at the site boundaries was evaluated at approx. 3.7×10^{-11} Bq/cm³ for Cs-134 and 1.2×10^{-10} Bq/cm³ for Cs-137 respectively. The radiation exposure dose due to the release of radioactive materials was less than 0.0015 mSv/year at the site boundaries.

Annual radiation dose at site boundaries by radioactive materials (cesium) released from Reactor Building Units 1-4



(Reference)

- * The density limit of radioactive materials in the air outside the surrounding monitoring area:
  [Cs-134]: 2×10^{-5} Bq/cm³
  [Cs-137]: 3×10^{-5} Bq/cm³
- * Dust density around the site boundaries of Fukushima Daiichi Nuclear Power Station (actual measured values):
  [Cs-134]: ND (Detection limit: approx. 1×10^{-7} Bq/cm³)
  [Cs-137]: ND (Detection limit: approx. 2×10^{-7} Bq/cm³)
- * Data of Monitoring Posts (MP1-MP8).
  Data of Monitoring Posts (MPs) measuring the airborne radiation rate around site boundaries showed 0.687 – 3.200 μSv/h (December 22, 2015 – January 26, 2016).
  To measure the variation in the airborne radiation rate of MP2-MP8 more accurately, environmental improvement (tree trimming, removal of surface soil and shielding around the MPs) was completed.

Note: Different formulas and coefficients were used to evaluate the radiation dose in the facility operation plan and monthly report. The evaluation methods were integrated in September 2012. As the fuel removal from the spent fuel pool (SFP) commenced for Unit 4, the radiation exposure dose from Unit 4 was added to the items subject to evaluation since November 2013. The evaluation has been changed to a method considering the values of continuous dust monitors since FY2015, with data to be evaluated monthly and announced the following month.

3. 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 abnormality 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

1. Contaminated water countermeasures

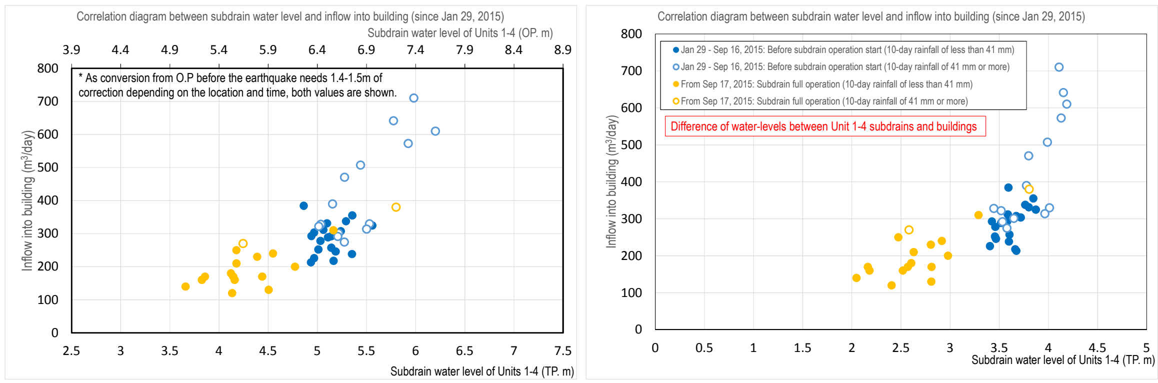
To tackle the increase in accumulated water due to groundwater inflow, fundamental measures to prevent such inflow into the Reactor Buildings will be implemented, while improving the decontamination capability of water treatment and preparing facilities to control the contaminated water

➢ Operation of groundwater bypass

- From April 9, 2014, the operation of 12 groundwater bypass pumping wells commenced sequentially to pump up groundwater. The release started from May 21, 2014 in the presence of officials from the Intergovernmental Liaison Office for the Decommissioning and Contaminated Water Issue of the Cabinet Office. As of January 26, 2016, 162,870 m³ of groundwater had been released. The pumped-up groundwater was temporarily stored in tanks and released after TEPCO and a third-party organization had confirmed that its quality met operational targets.
- For pumping well Nos. 7, 10 and 11, pumping of groundwater was suspended for cleaning (No. 7: November 27 – December 22, 2015; No. 10: from December 10, 2015; No. 11: from January 6, 2016).

➢ Status of water treatment facilities, including subdrains

- To reduce the groundwater flowing into the buildings, work began to pump up groundwater from wells (subdrains) around the buildings on September 3, 2015. The pumped-up groundwater was then purified at dedicated facilities and released from September 14, 2015. As of January 26, 2016, a total of 51,672 m³ had been drained after TEPCO and a third-party organization had confirmed that the quality of this purified groundwater met operational targets.
- Due to the level of the groundwater drain pond rising since the closure of the sea-side impermeable walls, pumping started on November 5, 2015. As of January 26, 2016, a total of 23,800 m³ had been pumped up. Approx. 180 m³/day is being transferred from the groundwater drain to the Turbine Buildings (average figure for period January 7-20, 2016).
- The effect of ground water inflow control by subdrains is evaluated by correlating both the “subdrain water levels” and the “difference between water levels in subdrains and buildings” for the time being.
- However, given insufficient data of the effect of rainfall after the subdrains went into operation, the effect of the inflow into buildings will be reviewed as necessary by accumulating data.
- Inflow into buildings reduced to approx. 150 m³/day during times when the subdrain water level decreased to approx. TP 3.5-4 m or when the difference with the water levels in buildings decreased to approx. 2-2.5 m after the subdrains went into operation.



As of January 14, 2016

Figure 1: Evaluation of inflow into buildings after the subdrains went into operation

➢ Construction status of the land-side impermeable walls

- To facilitate the installation of land-side impermeable walls surrounding Units 1-4 (a subsidy project of the Ministry of Economy, Trade and Industry), drilling to place frozen pipes commenced (from June 2, 2014).
- Regarding the mountain side, following the installation of frozen pipes on July 28, 2015, filling of brine was also completed on September 15, 2015. Through these works, preparation for freezing was completed for three sides on the mountain side.
- From April 30, 2015, the freezing functioning test got underway at 18 points (58 frozen pipes, approx. 6% on the mountain side). Brine supply to the freezing functioning test points was suspended from August 21, 2015 due to the filling of brine.
- Drilling on the sea side was completed on October 15, 2015 (for frozen pipes: 532 points, for temperature-measurement pipes: 131 points). As of November 9, 2015, installation of frozen pipes had been completed (see Figure 2). Following the connection of brine pipes, which was completed on January 6, 2016, filling of brine is currently underway (scheduled for completion in early February 2016).

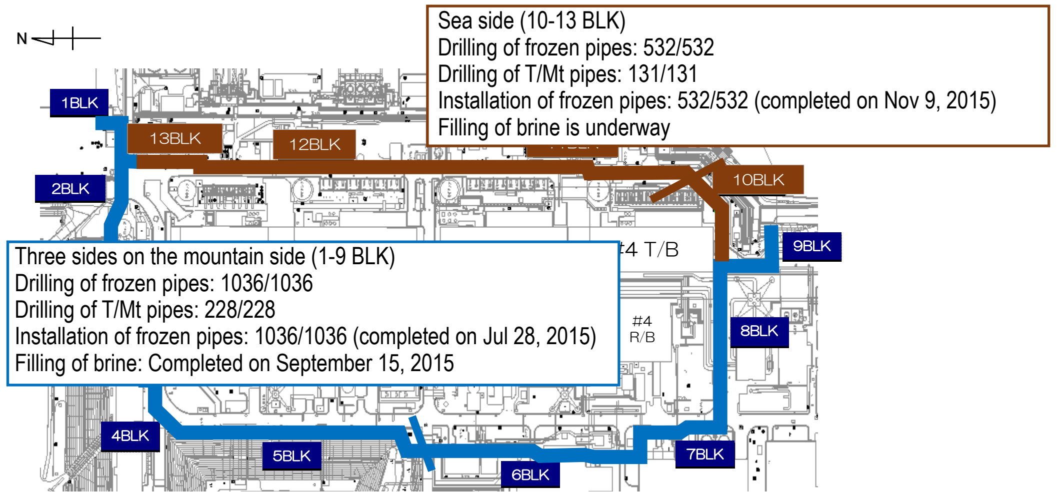
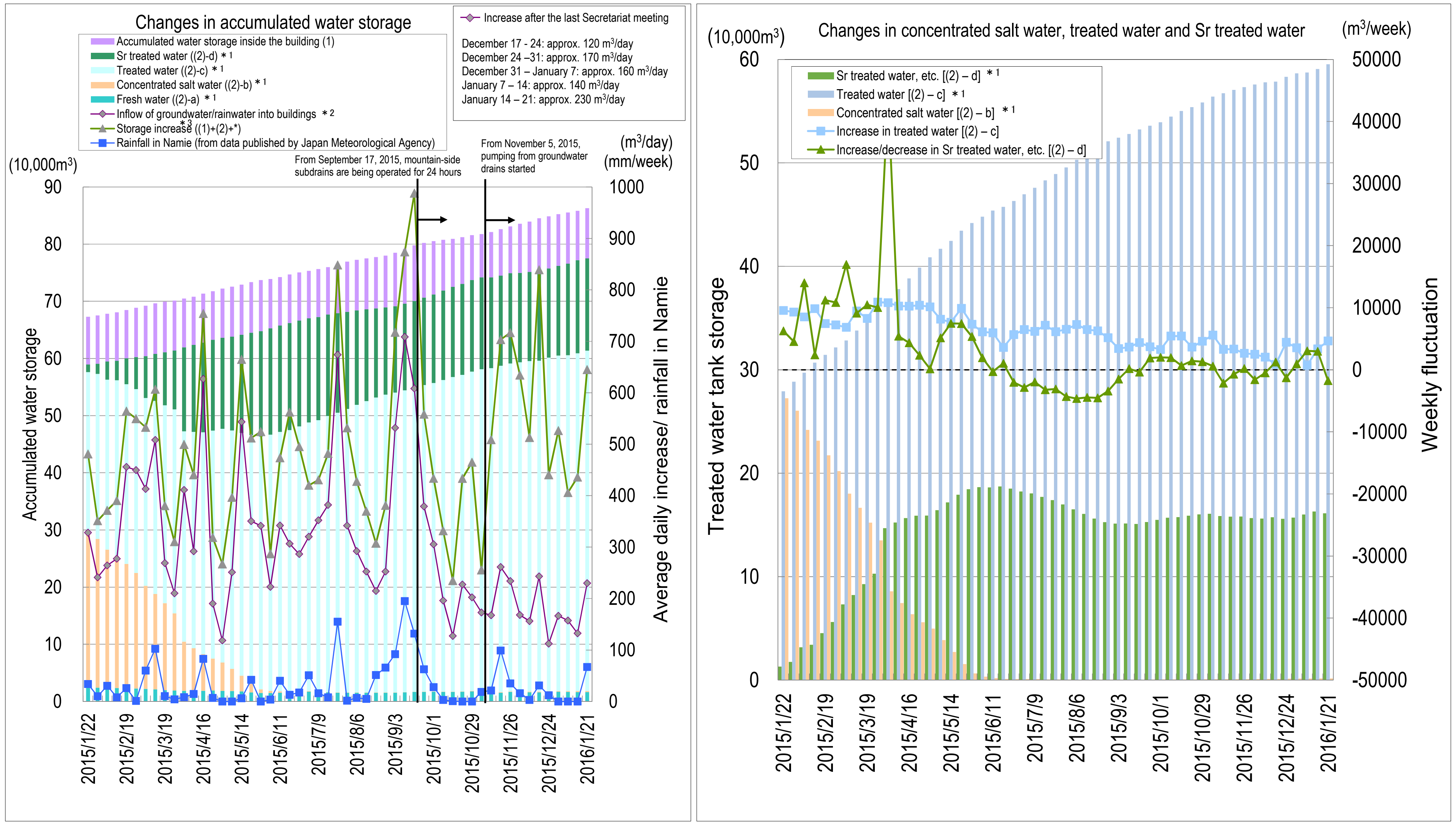


Figure 2: Drilling status for frozen-soil impermeable walls and installation of frozen pipes

- Operation of multi-nuclide removal equipment
  - Regarding multi-nuclide removal equipment (existing, additional and high-performance), hot tests using radioactive water are underway (for existing equipment, System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013; for additional equipment, System A: from September 17, 2014, System B: from September 27, 2014, System C: from October 9, 2014; for high-performance equipment, from October 18, 2014).
  - As of January 21, 2016, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 263,000, 241,000 and 97,000 m³ respectively (including approx. 9,500 m³ stored in the J1(D) tank, which contained water with a high density of radioactive materials at the System B outlet of existing multi-nuclide removal equipment).
  - For System B. facility inspections and the installation of additional absorption vessels to improve its performance have been underway since December 4, 2015.
  - For Systems A and B of additional multi-nuclide removal equipment, facility inspections have been underway since December 1, 2015.
  - To reduce the risks of strontium-treated water, treatment by additional and high-performance multi-nuclide removal equipment is underway (existing: from December 4, 2015, additional: from May 27, 2015, high-performance: from April 15, 2015). As of January 21, 2016, approx. 159,000 m³ had been treated.
- Toward reducing the risk of contaminated water stored in tanks
  - Treatment measures comprising the removal of strontium by cesium absorption apparatus (KURION) (from January 6, 2015) and secondary cesium absorption apparatus (SARRY) (from December 26, 2014) are underway. As of January 21, 2016, approx. 175,000 m³ had been treated.
- Measures in Tank Areas
  - Rainwater, under the release standard and having accumulated inside the fences in the contaminated water tank area, was sprinkled on site after eliminating radioactive materials using rainwater-treatment equipment since May 21, 2014 (as of January 25, 2016, a total of 43,170 m³).



As of January 21, 2016

*1: Water amount with which water-level gauge indicates 0% or more

*2: Since September 10, 2015, the data collection method has been changed (Evaluation based on increased in storage: in buildings and tanks → Evaluation based on increase/decrease in storage in buildings)

"Inflow of groundwater/rainwater into buildings" =
"Increase/decrease of water held in buildings"
+ "Transfer from buildings to tanks"
- "Transfer into buildings (water injection into reactors and transfer from well points, etc.)"

3: Since April 23, 2015, the data collection method has been changed (Increase in storage (1)+(2) → (1)+(2)+)

Figure 3: Status of accumulated water storage

2. 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. The removal of spent fuel from the Unit 4 pool commenced on November 18, 2013 and was completed on December 22, 2014

➢ Main work to help remove spent fuel at Unit 1

- On July 28, 2015, work started to remove the roof panels of the building cover. By October 5, 2015, all six roof panels had been removed. The removal of steel frames, which would hinder the installation of sprinklers, has been underway since January 8, 2016. The building cover is being dismantled with anti-scattering measures steadily implemented and safety prioritized above all.
- During the annual inspection of the 750t crawler crane used to dismantle the Unit 1 Reactor Building cover, which has been underway since December 2015, distortion and corrosion were detected in the jib. Future actions are being considered.

➢ Main work to help remove spent fuel at Unit 2

- To help remove the spent fuel from the pool of the Unit 2 Reactor Building, dismantling of hindrance buildings around the Reactor Building has been underway since September 7, 2015 to clear a work area in which to install large heavy-duty machines, etc.

➢ Main work to help remove spent fuel at Unit 3

- Following inspections and repair due to malfunction (January 13-19, 2016), one of the two large cranes used around the Unit 3 Reactor Building returned to active duty from January 21, 2016. Though inspections inside the spent fuel pool were initially conducted using a large high-performance crane, decontamination on the operating floor, which had been suspended, resumed from January 15, 2016.
- To ensure safe and steady fuel removal from the Unit 3 spent fuel pool, training of the remote control was conducted at the factory using the actual fuel-handling machine to be installed on site (from February to December 2015). To facilitate installation of the cover for fuel removal and the fuel-handling machine, decontamination and shielding on the operating floor will follow.

3. Fuel debris removal

In addition to decontamination and shield installation to improve PCV accessibility, technology was developed and data gathered as required to prepare to remove fuel debris (such as investigating and repairing PCV leak locations)

➢ Investigation inside the Unit 1 PCV

- The following were identified based on the investigative results from the Unit 1 grating outside the pedestal (April 2015).
  - ✓ Significant deposits in the accumulated water at the basement
  - ✓ Scope to access the upper part of the pedestal workers' access entrance
- Based on these findings, the status of the basement outside the PCV pedestal will be investigated using a remote-control robot and other devices to access the upper part of the pedestal workers' access entrance from the 1st floor grating, dropping dosimeters, underwater cameras, etc. at multiple points, and estimating the breadth status of fuel debris through visual inspections and by measuring the airborne radiation rate. An on-site demonstration will be conducted within FY2016.

➢ Progress of decontamination around Unit 2 X-6 penetration

- To facilitate the investigation into the status of the platform inside the Unit 2 PCV pedestal (A2 investigation), decontamination is underway around X-6 penetration from which the investigation device will be inserted (removal of eluted materials: October 30 – November 5, 2015, decontamination by steam: November 11 – 13, chemical decontamination: November 17 – December 7, surface grind: from December 11). On January 7, 2016, surface grind was suspended due to an increase in dust density detected near the workplace during the surface grind. Following additional chemical decontamination, the dose on the floor surface measured on January 19 was confirmed as equivalent to before the surface grind. As the dose had not decreased to the target level, dose-reduction methods, including anti-dust scattering measures, will be re-examined. Investigations inside the PCV will be conducted according to the decontamination status.

➢ Decontamination of the Unit 3 Reactor Building 1st floor

- To facilitate decontamination of the elevated portion of the first floor of the Unit 3 Reactor Building, the decontamination capability of the elevated (dry-ice blast) decontamination equipment is being assessed from December 23, 2015 (scheduled for completion in mid-February 2016).

➢ 3D laser scan measurement at the Unit 3 Reactor Building torus room

- To facilitate the obstacle evaluation required for the investigation to confirm the existence of leakage of Unit 3 PCV, repair, etc., a 3D data scan measurement inside the torus room was conducted (December 22, 2015 – January 22, 2016).

4. 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 December 2015, the total storage volume of concrete and metal rubble was approx. 172,900 m^3 (+1,800 m^3 compared to at the end of November 2015, with an area-occupation rate of 63%). The total storage volume of trimmed trees was approx. 85,100 m^3 (+600 m^3 compared to at the end of November 2015, with an area-occupation rate of 80%). The increase in rubble was mainly attributable to construction related to facing and the installation of tanks. The increase in trimmed trees was mainly attributable to facing-related construction.

➢ Management status of secondary waste from water treatment

- As of January 21, 2016, the total storage volume of waste sludge was 597 m^3 (area-occupation rate: 85%) and that of concentrated waste fluid was 9,280 m^3 (area-occupation rate: 46%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal equipment, etc. was 2,967 (area-occupation rate: 49%).

➢ Test operation of the Radioactive Waste Incinerator

- A cold test incinerating dummy waste, which generates no contamination, was conducted to verify facility-wide functions and performance (November 25, 2015 – January 22, 2016). Following a pre-operation test, a hot test using actual contaminated waste will be conducted from February to facilitate the operation launch within this fiscal year.

5. Reactor cooling

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

➢ Installation of permanent monitoring instruments inside Unit 3 PCV

- Thermometers and water-level gages were installed from the Unit 3 PCV penetration (X-53) into the PCV (December 11, 2015). Data from these instruments was then monitored and assessed for about one month after the installation, and these instruments started operating as monitors on January 27, 2016.

6. 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 to 4

- Regarding the radioactive materials in the groundwater near the bank on the north side of the Unit 1 intake, the tritium density at groundwater Observation Hole No. 0-1 has been increasing since December 2015 and currently stands at around 3,000 Bq/L.

- Regarding the groundwater near the bank between the Unit 1 and 2 intakes, though the tritium density at groundwater Observation Hole No. 1-9 has been increasing since December 2015, it currently stands at around 500 Bq/L. Though the density of gross β radioactive materials at groundwater Observation Hole No. 1-12 increased to 5,000 Bq/L on January 1, 2016, it decreased to 630 Bq/L according to the re-sampling result on January 2 and has continued decreasing ever since. Since August 15, 2013, pumping of groundwater continued (at the well point between the Unit 1 and 2 intakes: August 15, 2013 – October 13, 2015 and from October 24; at the repaired well point: October 14 - 23, 2015).
- Regarding radioactive materials in the groundwater near the bank between the Unit 2 and 3 intakes, though the density of gross β radioactive materials at groundwater Observation Hole Nos.2, 2-2, 2-3 and 2-7 increased to 460 – 870 Bq/L on December 31, 2015, it decreased to the previous level of 230 – 740 Bq/L according to the re-sampling result on January 1, 2016. Though the density of gross β radioactive materials at groundwater Observation Hole No. 2-5 has remained constant at around 10,000 Bq/L, it has been increasing since November 2015 and currently stands at around 200,000 Bq/L. Since December 18, 2013, pumping of groundwater continued (at the well point between the Unit 2 and 3 intakes: December 18, 2013 - October 13, 2015; at the repaired well point: from October 14, 2015).
- Regarding radioactive materials in the groundwater near the bank between the Unit 3 and 4 intakes, the density of gross β radioactive materials at groundwater Observation Hole No. 3-2 has been increasing since December 2015 and currently stands at around 1,000 Bq/L. Since April 1, 2015, pumping of groundwater continued (at the well point between the Unit 3 and 4 intakes: April 1 – September 16, 2015; at the repaired well point: from September 17, 2015).
- Regarding the radioactive materials in seawater outside the sea-side impermeable walls and within the open channels of Units 1 - 4, as well as those inside the port, the density was declining due to the effect of the completed installation and the connection of steel pipe sheet piles for the sea-side impermeable walls.
- Regarding the radioactive materials in seawater outside the port, the densities of cesium 137 and tritium have remained within the same range previously recorded.

➢ Progress status of dose reduction within the site

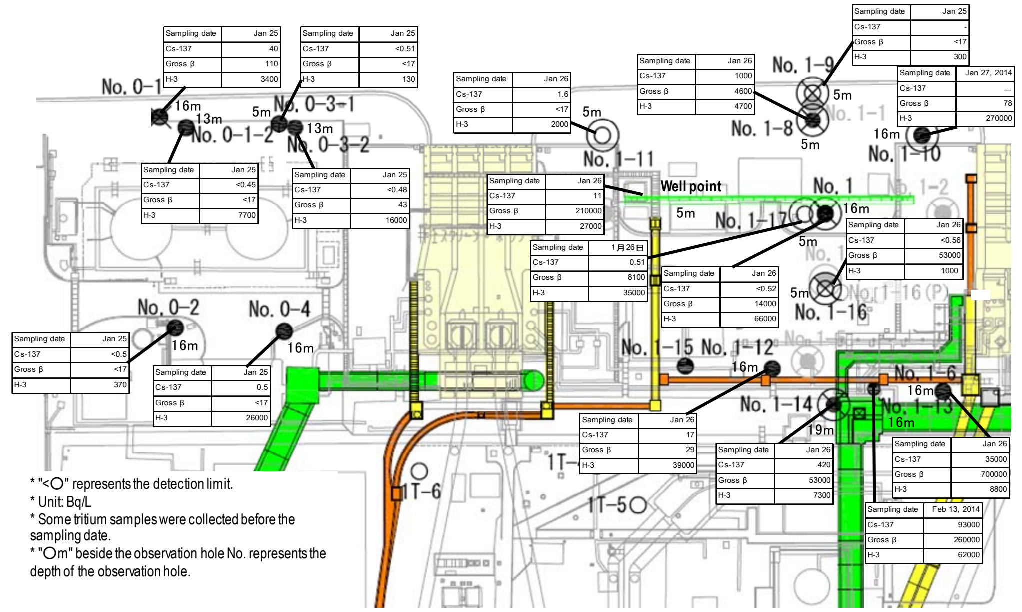
- As decontamination and facing of the mountain side slope of the Unit 1-4 buildings were completed, the average dose rate of the ground surface was evaluated to confirm the effect of decontamination. The result showed that the rate had decreased from 222 to 5 μSv/h or less.

➢ Additional installation of dose-rate monitors

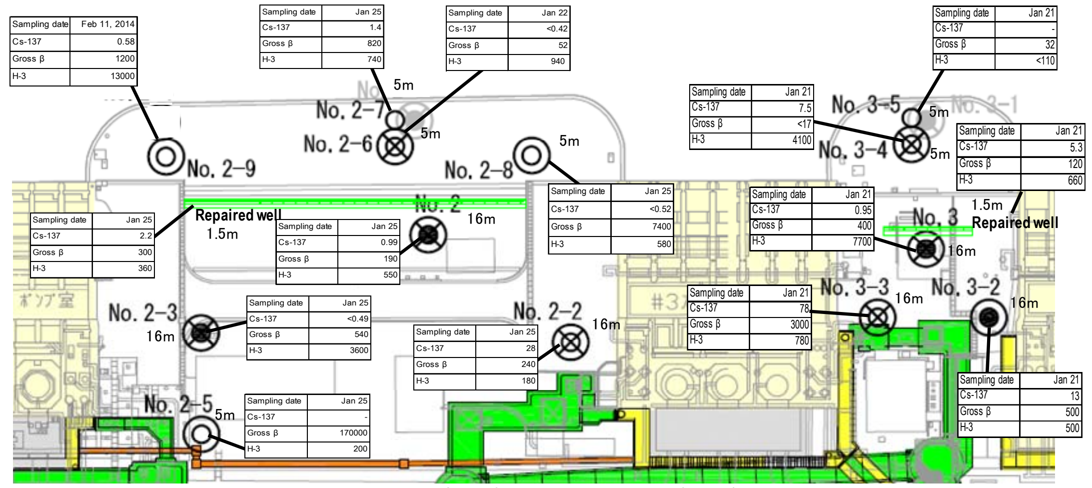
- To help workers in the Fukushima Daiichi Nuclear Power Station understand the dose rate at their workplaces, dose-rate monitors have been installed to display the real-time dose rate at each point (a total of 86 monitors, including an additional 66 units installed on January 4, 2016). Furthermore, large-scale displays were also installed in the Main Anti-Earthquake Building and the access control facility to allow workers to confirm the dose rate at their workplaces before leaving for the sites.

➢ Alarm issued from a continuous dust monitor

- On January 13, a "high alarm" (alarm setting value: 1.0×10^{-5} Bq/cm^3) indicating increased density of the continuous dust monitor installed near monitoring post No. 7 was issued. The density declined to an ordinary level the same day. No significant change in values of dust monitors and monitoring posts within the site was identified except for this dust monitor.
- As an analysis of sand dust (soil dust) from the roads near the monitoring post No. 7 detected cesium 134 and 137, it was probable that the "high alarm" of the dust monitor was not triggered by work on site but by sand dust stirred up by dump trucks traversing the road located outside the site (on the south side), which increased the dust density locally and was detected by the dust monitor near monitoring post No. 7.
- Consideration will begin regarding removal of the sand (soil) dust from the relevant road, etc.



<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 density on the Turbine Building east side

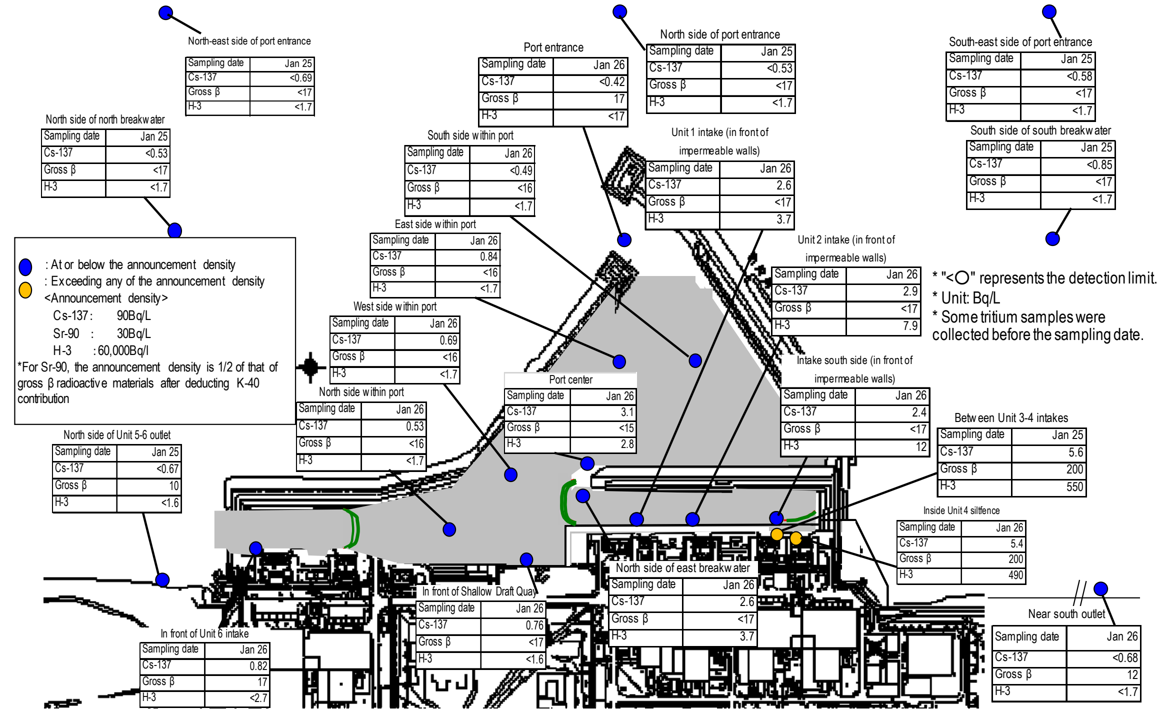


Figure 5: Seawater density around the port

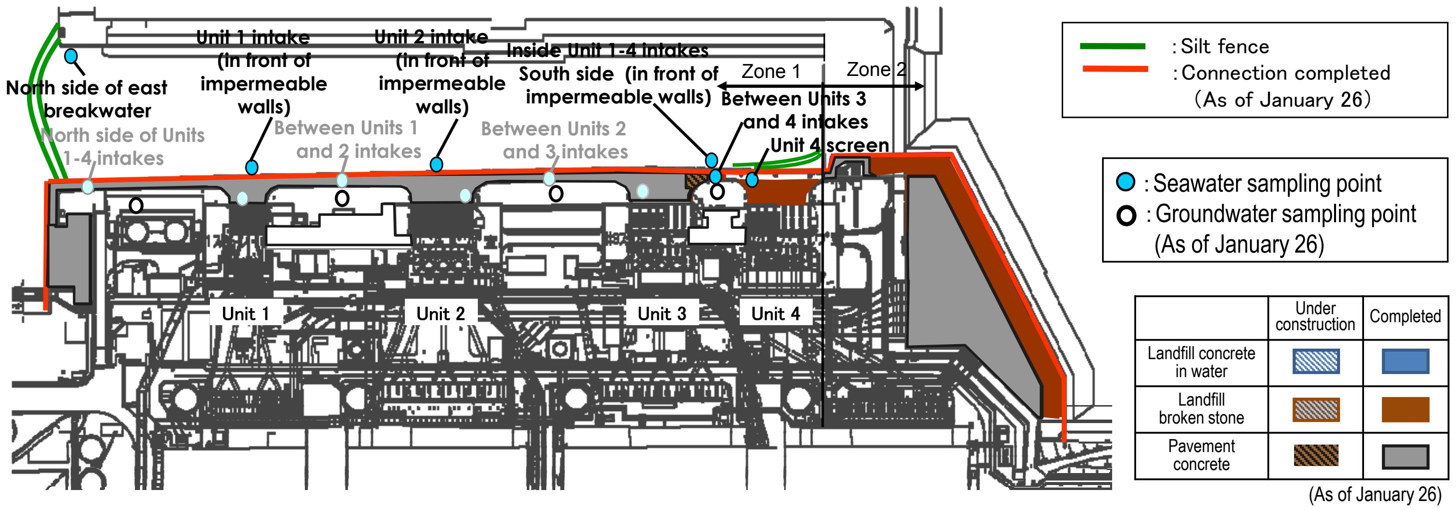


Figure 6: Progress status of impermeable walls on the sea side

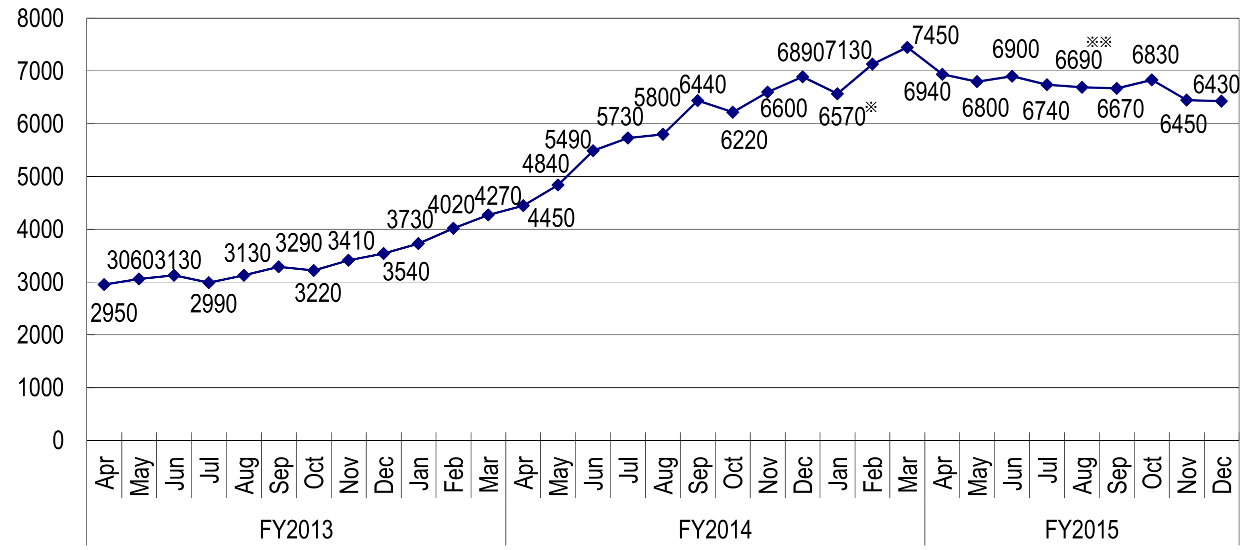
7. Review of the number of staff required and efforts to improve the labor environment and conditions

Securing appropriate staff long-term while thoroughly implementing workers' exposure dose control. Improving the work environment and labor conditions continuously based on an understanding of workers' on-site needs

➢ Staff management

- The monthly average total of people registered for at least one day per month to work on site during the past quarter from September to November 2015 was approx. 13,800 (TEPCO and partner company workers), which exceeded the monthly average number of actual workers (approx. 10,800). Accordingly, sufficient people are registered to work on site.
- It was confirmed with the prime contractors that the estimated manpower necessary for the work in February 2016 (approx. 6,500 per day: TEPCO and partner company workers)* would be secured at present. The average numbers of workers per day for each month (actual values) were maintained, with approx. 3,000 to 7,500 since FY2013 (see Figure 7).

  Some works for which contractual procedures have yet to be completed are excluded from the estimate for February 2016.
- The number of workers from Fukushima Prefecture has remained the same but the number from outside the prefecture has increased slightly. Accordingly, the local employment ratio (TEPCO and partner company workers) as of December 2015 remained at around 50%.
- The average exposure dose of workers remained at approx. 1 mSv/month during FY2013, FY2014 and FY2015. (Reference: Annual average exposure dose 20 mSv/year ≒ 1.7 mSv/month)
- For most workers, the exposure dose was sufficiently within the limit and allowed them to continue engaging in radiation work.



※ Calculated based on the number of workers as of January 20 (due to safety inspection from January 21)

※※ Calculated based on the number of workers from August 3-7, 24-28 and 31 (due to overhaul of heavy machines)

Figure 7: Changes in the average number of workers per weekday for each month since FY2013

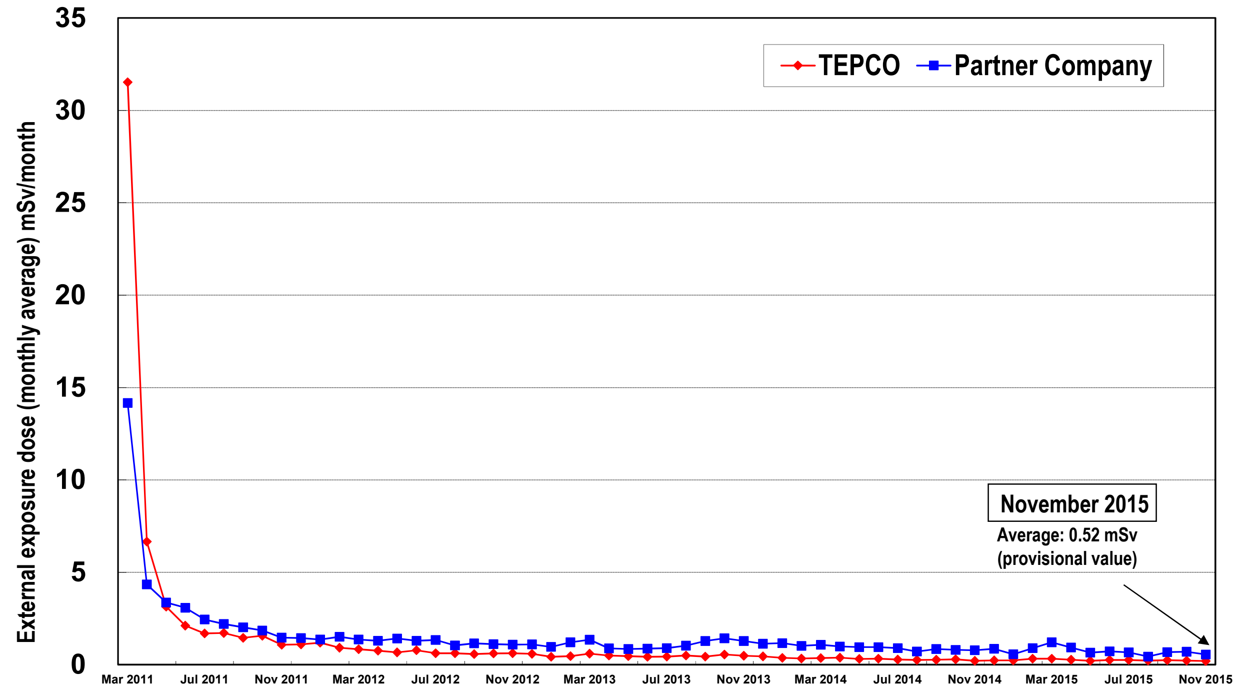


Figure 8: Changes in monthly individual worker exposure dose
(monthly average exposure dose since March 2011)

➢ Measures to prevent infection and expansion of influenza and norovirus

- Since October, measures for influenza and norovirus have been implemented, including free influenza vaccinations (subsidized by TEPCO) in the Fukushima Daiichi Nuclear Power Station (October 28 - December 4, 2015) and medical clinics around the site (November 2, 2015 - January 29, 2016) for partner company workers. As of January 25, 2016, a total of 8,558 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 (control of swift entry/exit and mandatory wearing of masks in working spaces).

- Status of influenza and norovirus cases
  - Until the 4th week of 2016 (January 18-24, 2016), there were 22 influenza infections and 8 norovirus infections. The totals for the same period for the previous season showed 279 influenza infections and 5 norovirus infections. The totals for the entire previous season (November 2014 - March 2015) showed 353 influenza infections and 10 norovirus infections.

9. Other

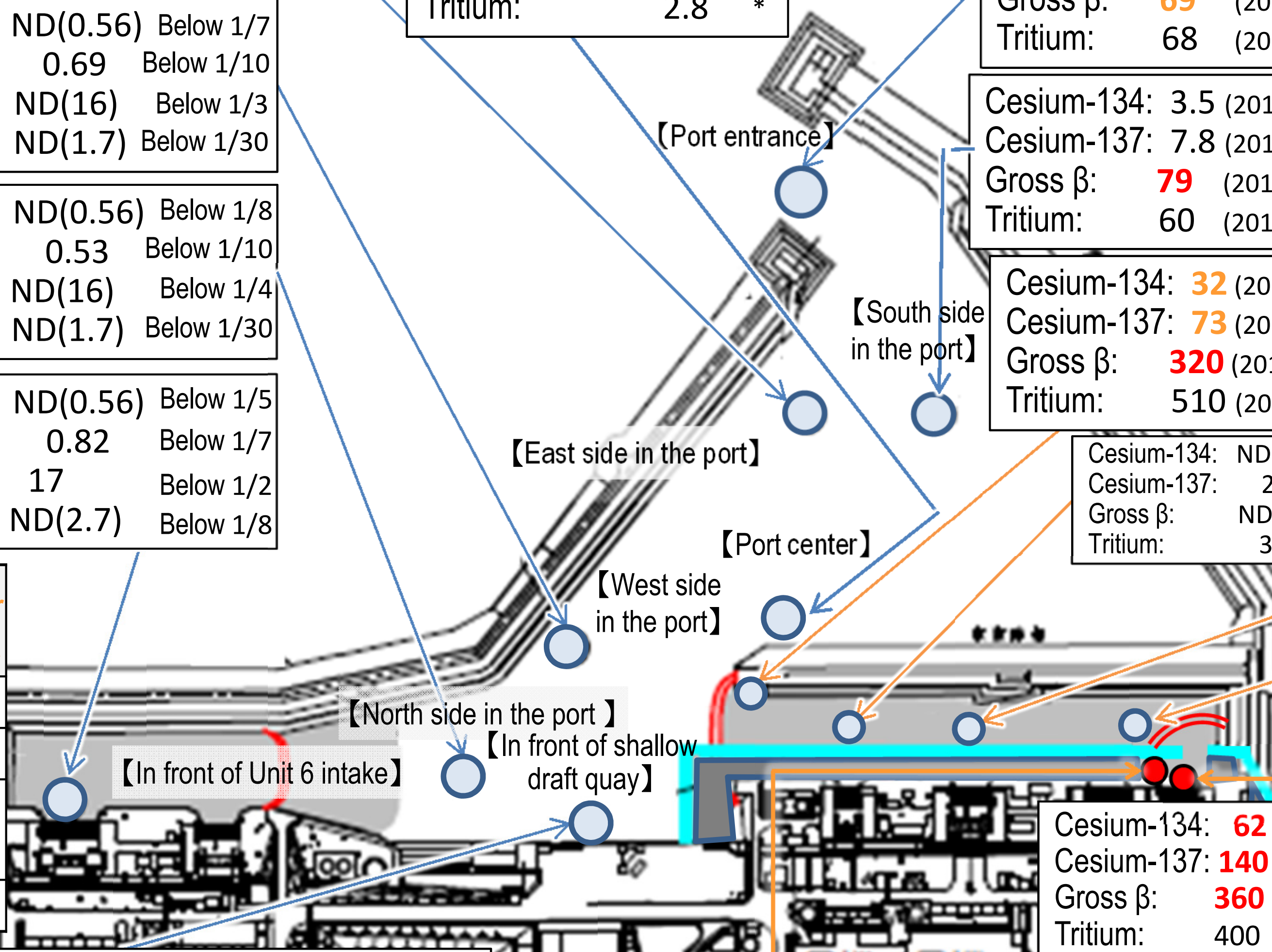
- Offering a letter of appreciation to the work teams involved in decommissioning and countermeasures for contaminated water treatment
  - Aiming to inspire and motivate companies and workers and publicize their outstanding achievements, letters of appreciation will be offered in the International Forum on the Decommissioning of the Fukushima Daiichi Nuclear Power Station in April to work teams comprising prime contractors and partner companies who boldly took on difficult challenges and rendered distinguished services.

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 January 19-26)"; unit (Bq/L); ND represents a value below the detection limit

Source: TEPCO website Analysis results on nuclides of radioactive materials around Fukushima Daiichi Nuclear Power Station http://www.tepco.co.jp/nu/fukushima-np/f1/smp/index-j.html

Sea side impermeable wall
Silt fence



Cesium-134: 3.3 (2013/10/17) → ND(0.51) Below 1/6
Cesium-137: 9.0 (2013/10/17) → 0.84 Below 1/10
Gross β: 74 (2013/ 8/19) → ND(16) Below 1/4
Tritium: 67 (2013/ 8/19) → ND(1.7) Below 1/30

Cesium-134: 4.4 (2013/12/24) → ND(0.56) Below 1/7
Cesium-137: 10 (2013/12/24) → 0.69 Below 1/10
Gross β: 60 (2013/ 7/ 4) → ND(16) Below 1/3
Tritium: 59 (2013/ 8/19) → ND(1.7) Below 1/30

Cesium-134: 5.0 (2013/12/2) → ND(0.56) Below 1/8
Cesium-137: 8.4 (2013/12/2) → 0.53 Below 1/10
Gross β: 69 (2013/8/19) → ND(16) Below 1/4
Tritium: 52 (2013/8/19) → ND(1.7) Below 1/30

Cesium-134: 2.8 (2013/12/2) → ND(0.56) Below 1/5
Cesium-137: 5.8 (2013/12/2) → 0.82 Below 1/7
Gross β: 46 (2013/8/19) → 17 Below 1/2
Tritium: 24 (2013/8/19) → ND(2.7) Below 1/8

Cesium-134: 0.61
Cesium-137: 3.1
Gross β: ND(15)
Tritium: 2.8 *

Cesium-134: 3.3 (2013/12/24) → ND(0.49) Below 1/6
Cesium-137: 7.3 (2013/10/11) → ND(0.42) Below 1/10
Gross β: 69 (2013/ 8/19) → 17 Below 1/4
Tritium: 68 (2013/ 8/19) → ND(1.7) Below 1/40

Cesium-134: 3.5 (2013/10/17) → ND(0.57) Below 1/6
Cesium-137: 7.8 (2013/10/17) → ND(0.49) Below 1/10
Gross β: 79 (2013/ 8/19) → ND(16) Below 1/4
Tritium: 60 (2013/ 8/19) → ND(1.7) Below 1/30

Cesium-134: 32 (2013/10/11) → 0.75 Below 1/40
Cesium-137: 73 (2013/10/11) → 2.6 Below 1/20
Gross β: 320 (2013/ 8/12) → ND(17) Below 1/10
Tritium: 510 (2013/ 9/ 2) → 3.7 Below 1/100

Cesium-134: ND(0.56)
Cesium-137: 2.6
Gross β: ND(17)
Tritium: 3.7 *

Cesium-134: ND(0.54)
Cesium-137: 2.9
Gross β: ND(17)
Tritium: 7.9 *

Cesium-134: ND(0.58)
Cesium-137: 2.4
Gross β: ND(17)
Tritium: 12 *

* Monitoring commenced in or after March 2014

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

Cesium-134: 62 (2013/ 9/16) → ND(2.9) Below 1/20
Cesium-137: 140 (2013/ 9/16) → 5.4 Below 1/20
Gross β: 360 (2013/ 8/12) → 200
Tritium: 400 (2013/ 8/12) → 490

Summary of TEPCO data as of January 27

Cesium-134: 5.3 (2013/8/ 5) → ND(0.70) Below 1/7
Cesium-137: 8.6 (2013/8/ 5) → 0.76 Below 1/10
Gross β: 40 (2013/7/ 3) → ND(17) Below 1/2
Tritium: 340 (2013/6/26) → ND(1.6) Below 1/200

Cesium-134: 28 (2013/ 9/16) → ND(2.3) Below 1/10
Cesium-137: 53 (2013/12/16) → 5.6 Below 1/9
Gross β: 390 (2013/ 8/12) → 200
Tritium: 650 (2013/ 8/12) → 550

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

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

(The latest values sampled during January 20-26)

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

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

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

Cesium-134: ND (2013) → ND (0.80)
Cesium-137: ND (2013) → ND (0.69)
Gross β: ND (2013) → ND (17)
Tritium: ND (2013) → ND (1.7)

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

Cesium-134: ND (2013) → ND (0.70)
Cesium-137: 1.6 (2013/10/18) → ND (0.53) Below 1/3
Gross β: ND (2013) → ND (17)
Tritium: 6.4 (2013/10/18) → ND (1.7) Below 1/3

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

Cesium-134: ND (2013) → ND (0.74)
Cesium-137: ND (2013) → ND (0.58)
Gross β: ND (2013) → ND (17)
Tritium: ND (2013) → ND (1.7)

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

Cesium-134: ND (2013) → ND (0.68)
Cesium-137: ND (2013) → ND (0.53)
Gross β: ND (2013) → ND (17)
Tritium: 4.7 (2013/ 8/18) → ND (1.7) Below 1/2

【Port entrance】

Cesium-134: 3.3 (2013/12/24) → ND (0.49) Below 1/6
Cesium-137: 7.3 (2013/10/11) → ND (0.42) Below 1/10
Gross β: 69 (2013/ 8/19) → 17 Below 1/4
Tritium: 68 (2013/ 8/19) → ND (1.7) Below 1/40

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

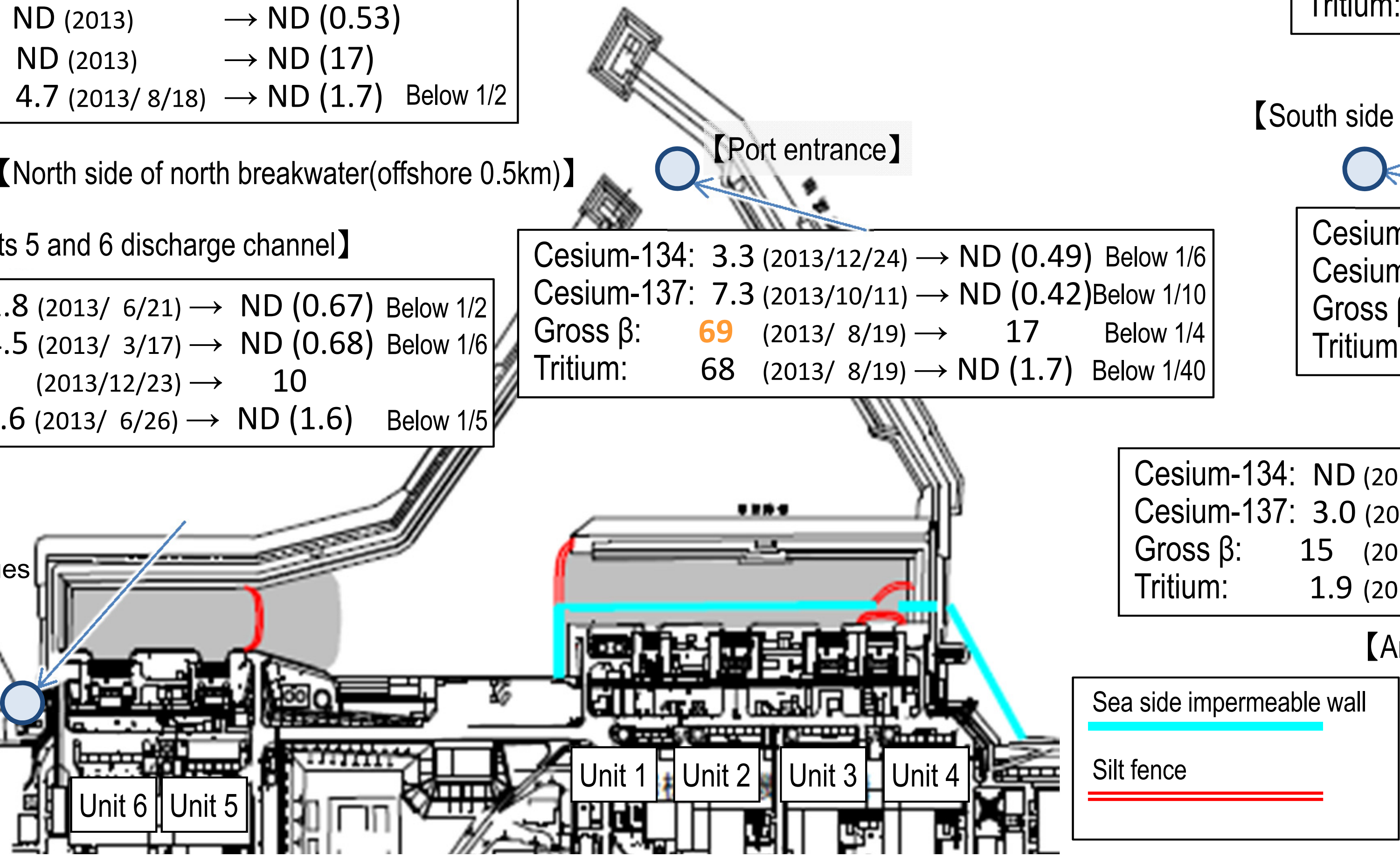
Cesium-134: ND (2013) → ND (0.73)
Cesium-137: ND (2013) → ND (0.85)
Gross β: ND (2013) → ND (17)
Tritium: ND (2013) → ND (1.7)

【North side of Units 5 and 6 discharge channel】

Cesium-134: 1.8 (2013/ 6/21) → ND (0.67) Below 1/2
Cesium-137: 4.5 (2013/ 3/17) → ND (0.68) Below 1/6
Gross β: 12 (2013/12/23) → 10
Tritium: 8.6 (2013/ 6/26) → ND (1.6) Below 1/5

【Around south discharge channel】

Cesium-134: ND (2013) → ND (0.55)
Cesium-137: 3.0 (2013/ 7/15) → ND (0.68) Below 1/4
Gross β: 15 (2013/12/23) → 12
Tritium: 1.9 (2013/11/25) → ND (1.7)

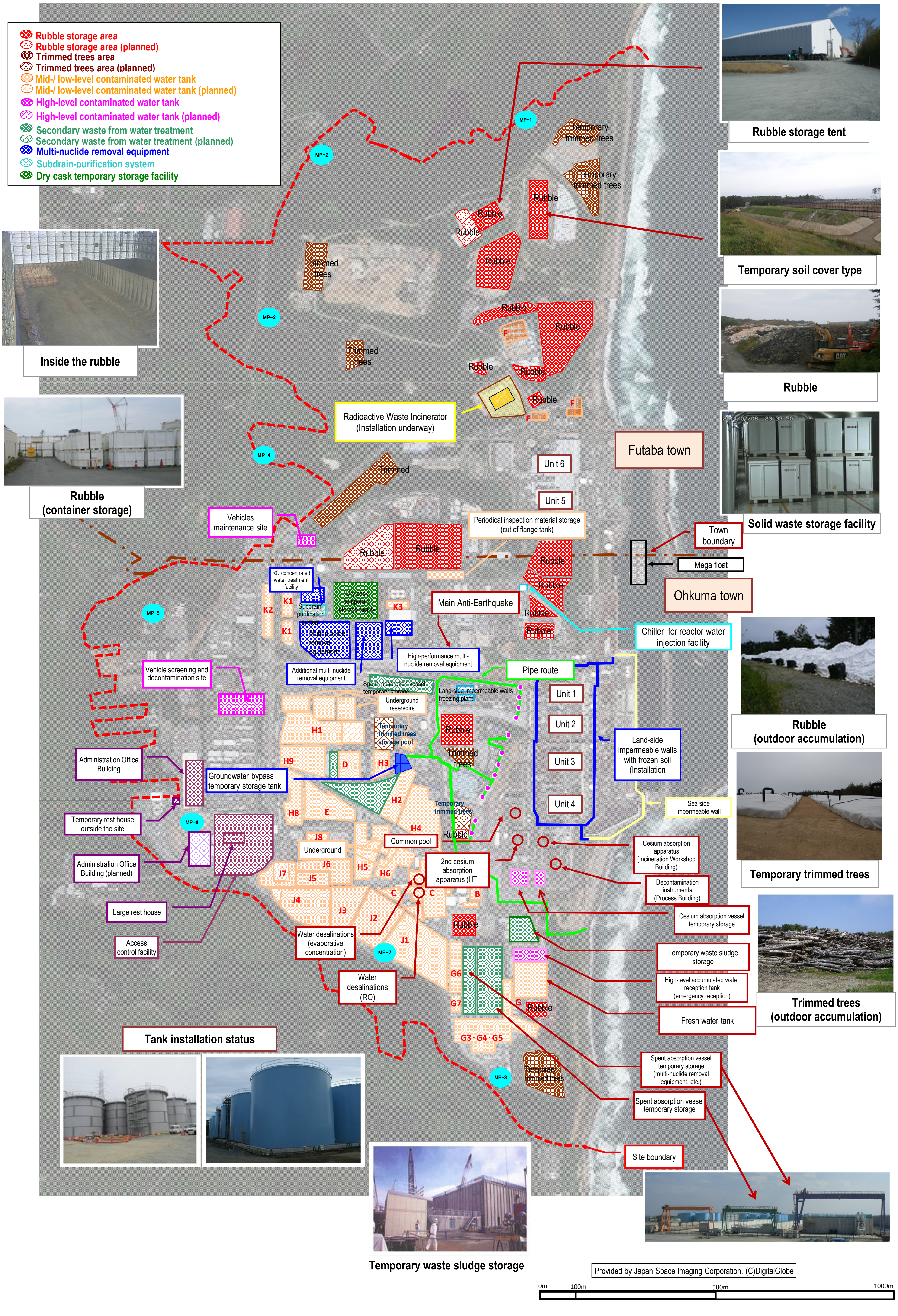


Note: The gross β measurement values include natural potassium 40 (approx. 12 Bq/L). They also include the contribution of yttrium 90, which radioactively balance strontium 90.

Summary of TEPCO data as of January 27

Appendix 2
January 28, 2016

TEPCO Fukushima Daiichi Nuclear Power Station Site Layout



Progress toward decommissioning: Fuel removal from the spent fuel pool (SFP)

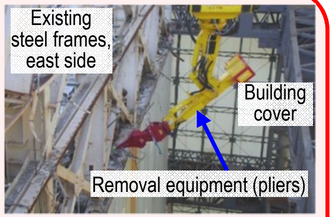
Immediate target	Commence fuel removal from the Unit 1-3 Spent Fuel Pools

Unit 1

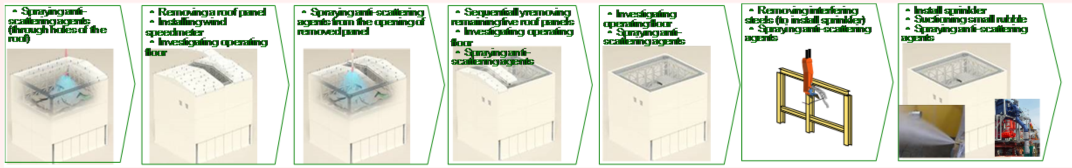
Regarding fuel removal from Unit 1 spent fuel pool, there is a plan to install a dedicated cover for fuel removal over the operating floor(*1).

Before starting this plan, the building cover will be dismantled to remove rubble from the top of the operating floor, with anti-scattering measures steadily implemented.

All panels were removed on October 5, 2015. Removal of steel frames, which would hinder the installation of sprinklers as measures to prevent dust scattering, is underway from January 8, 2016. Dismantling of the building cover will proceed with radioactive materials thoroughly monitored.



Removal of hindering steel frames



Flow of building cover dismantling

Unit 2

To facilitate removal of fuel assemblies and debris in the Unit 2 spent fuel pool, the scope of dismantling and modification of the existing Reactor Building rooftop was examined. From the perspective of ensuring safety during the work, controlling impacts on the outside of the power station, and removing fuel rapidly to reduce risks, we decided to dismantle the whole rooftop above the highest floor of the Reactor Building.

Examination of the following two plans continues: Plan 1 to share a container for removing fuel assemblies and debris from the pool; and Plan 2 to install a dedicated cover for fuel removal from the pool.

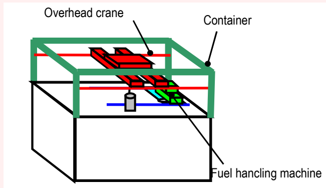


Image of Plan 1

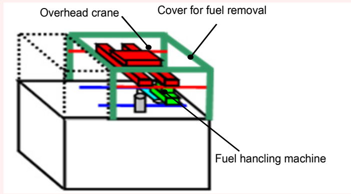


Image of Plan 2

Unit 3

To facilitate the installation of a cover for fuel removal, removal of large rubble from the spent fuel pool was completed in November 2015. Measures to reduce dose (decontamination and shielding) are underway. (from October 15, 2013)

To ensure safe and steady fuel removal, training of remote control was conducted at the factory using the actual fuel-handling machine which will be installed on site (February – December 2015).

After implementing the dose-reduction measures, the cover for fuel removal and the fuel-handling machine will be installed.


Fuel gripper (mast)


Manipulator

Fuel-handling facility (in the factory)

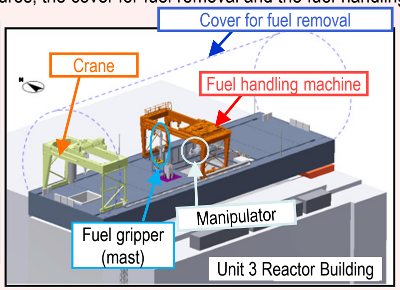


Image of entire fuel handling facility inside the cover

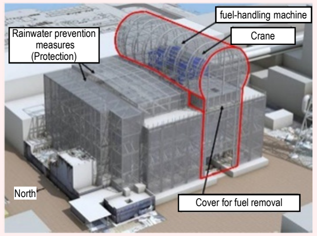


Image of the cover for fuel removal

Unit 4

In the Mid- and Long-Term Roadmap, the target of Phase 1 involved commencing fuel removal from inside the spent fuel pool (SFP) of the 1st Unit within two years of completion of Step 2 (by December 2013). On November 18, 2013, fuel removal from Unit 4, or the 1st Unit, commenced and Phase 2 of the roadmap started.

On November 5, 2014, within a year of commencing work to remove the fuel, all 1,331 spent fuel assemblies in the pool had been transferred. The transfer of the remaining non-irradiated fuel assemblies to the Unit 6 SFP was completed on December 22, 2014. (2 of the non-irradiated fuel assemblies were removed in advance in July 2012 for fuel checks)

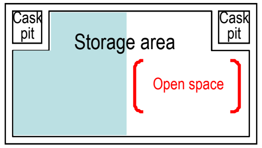
This marks the completion of fuel removal from the Unit 4 Reactor Building.

Based on this experience, fuel assemblies will be removed from Unit 1-3 pools.


Fuel removal status

* A part of the photo is corrected because it includes sensitive information related to physical protection.

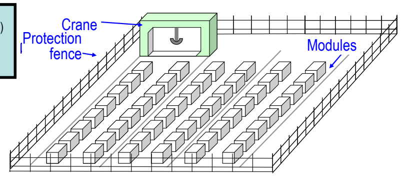
Common pool



An open space will be maintained in the common pool (Transfer to the temporary dry cask storage facility)

Progress to date
- The common pool has been restored to a condition allowing it to re-accommodate fuel to be handled (November 2012)
- Loading of spent fuel stored in the common pool to dry casks commenced (June 2013)
- Fuel removed from the Unit 4 spent fuel pool began to be received (November 2013)

Temporary dry cask (*3) storage facility



Spent fuel is accepted from the common pool

Operation commenced on April 12, 2013; from the cask-storage building, transfer of 9 existing dry casks completed (May 21, 2013); fuel stored in the common pool sequentially transferred.

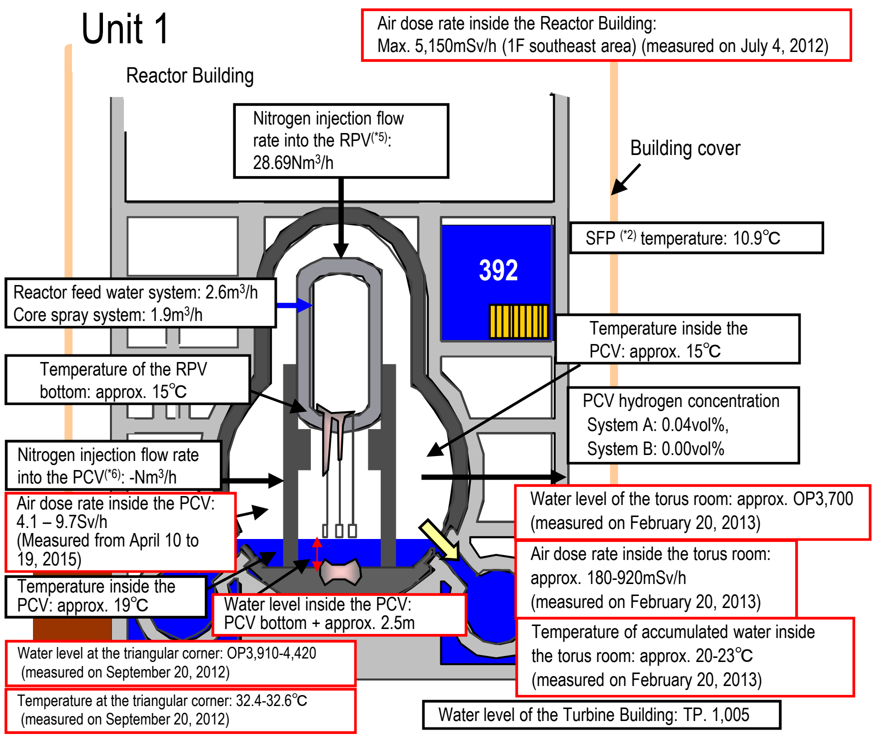
<Glossary>
(*1) Operating floor: During regular inspection, the roof over the reactor is opened while on the operating floor, fuel inside the core is replaced and the core internals are inspected.
(*2) Cask: Transportation container for samples and equipment, including radioactive materials.

Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

Immediate target	Identify the plant status and commence R&D and decontamination toward fuel debris removal

Investigation into TIP Room of the Unit 1 Reactor Building

- To improve the environment for future investigations inside the PCV, etc., an investigation was conducted from September 24 to October 2, 2015 at the TIP Room(*1). (Due to high dose around the entrance in to the TIP Room, the investigation of dose rate and contamination distribution was conducted through a hole drilled from the walkway of the Turbine Building, where the dose was low)
- The investigative results identified high dose at X-31 to 33 penetrations(*2) (instrumentation penetration) and low dose at other parts.
- As it was confirmed that work inside the TIP room would be available, the next step will include identification of obstacles which will interfere the work inside the TIP Room and formulation of a plan for dose reduction.



* Indices related to the plant are values as of 11:00, January 27, 2016

Investigations inside PCV	1st (Oct 2012)	- Acquiring images - Measuring air temperature and dose rate - Measuring water level and temperature - Sampling accumulated water - Installing permanent monitoring instrumentation
	2nd (Apr 2015)	Confirming the status of PCV 1st floor - Acquiring images - Measuring air temperature and dose rate - Replacing permanent monitoring instrumentation
Leakage points from PCV	- PCV vent pipe vacuum break line bellows (identified in May 2014) - Sand cushion drain line (identified in November 2013)	

Investigation in the leak point detected in the upper part of the Unit 1 Suppression Chamber (S/C(*3))

Investigation in the leak point detected in the upper part of Unit 1 S/C from May 27, 2014 from one expansion joint cover among the lines installed there. As no leakage was identified from other parts, specific methods will be examined to halt the flow of water and repair the PCV.

Leak point

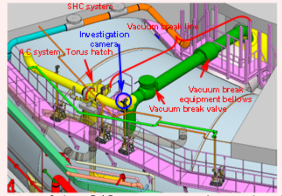


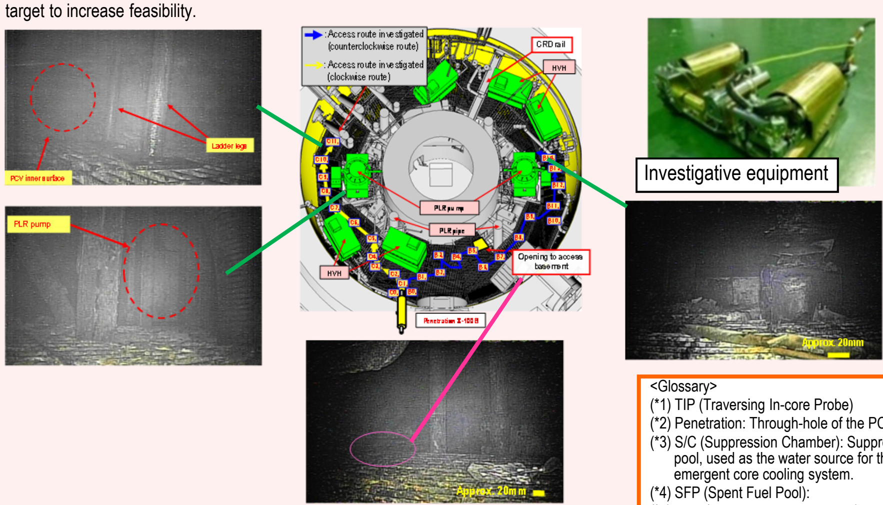
Image of the S/C upper part investigation

Status of equipment development toward investigating inside the PCV

Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigation inside the PCV is scheduled.

[Investigative outline]
- Inserting equipment from Unit 1 X-100B penetration(*5) to investigate in clockwise and counter-clockwise directions.

[Status of investigation equipment development]
- Using the crawler-type equipment with a shape-changing structure which allows it to enter the PCV from the narrow access entrance (bore: ϕ 100mm) and stably move on the grating, a field demonstration was implemented from April 10 to 20, 2015. Through this investigation, information including images and airborne radiation inside the PCV 1st floor was obtained.
- Based on the investigative results in April 2015 and additional information obtained later, an investigation on the PCV basement floor will be conducted in a method of traveling on the 1st floor grating and dropping cameras, dosimeters, etc. from above the investigative target to increase feasibility.



Investigation inside PCV

<Glossary>
(*1) TIP (Traversing In-core Probe)
(*2) Penetration: Through-hole of the PCV
(*3) S/C (Suppression Chamber): Suppression pool, used as the water source for the emergent core cooling system.
(*4) SFP (Spent Fuel Pool):
(*5) RPV (Reactor Pressure Vessel)
(*6) PCV (Primary Containment Vessel)

Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

January 28, 2016
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

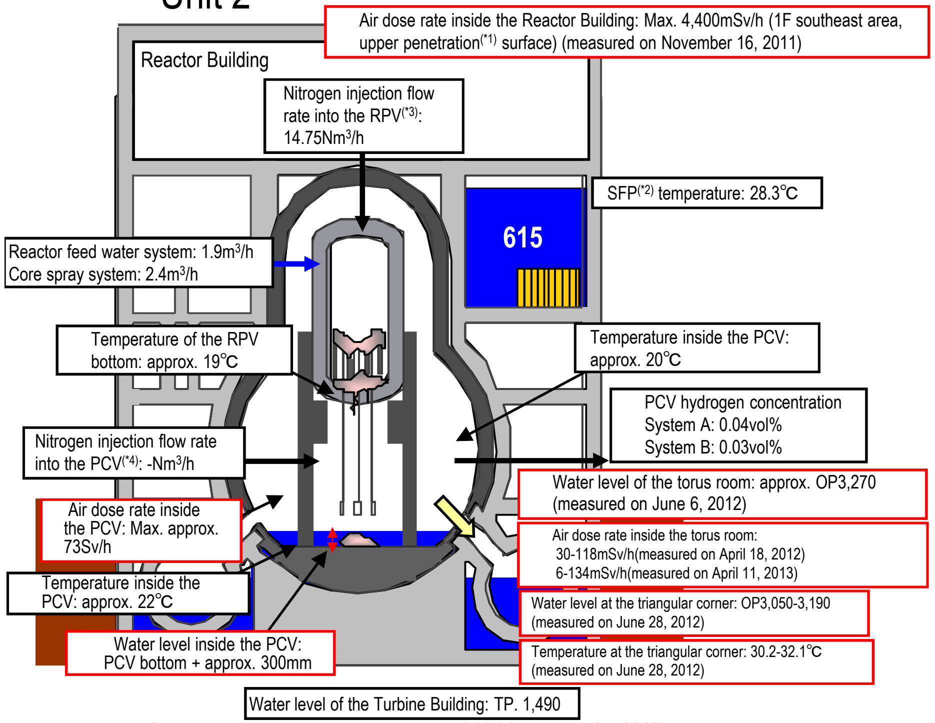
Immediate target	Identify the plant status and commence R&D and decontamination toward fuel debris removal

Installation of an RPV thermometer and permanent PCV supervisory instrumentation

(1) Replacement of the RPV thermometer
- As the thermometer installed at the Unit 2 RPV bottom after the earthquake had broken in February 2014, it was excluded from the monitoring thermometers.
- On April 2014, removal of the broken thermometer failed and was suspended. Rust-stripping chemicals were injected and the broken thermometer was removed on January 2015. A new thermometer was reinstalled on March. The thermometer has been used as a part of permanent supervisory instrumentation since April.

(2) Reinstallation of the PCV thermometer and water-level gauge
- Some of the permanent supervisory instrumentation for PCV could not be installed in the planned locations due to interference with existing grating (August 2013). The instrumentation was removed on May 2014 and new instruments were reinstalled on June 2014. The trend of added instrumentation will be monitored for approx. one month to evaluate its validity.
- The measurement during the installation confirmed that the water level inside the PCV was approx. 300mm from the bottom.

Unit 2



* Indices related to plant are values as of 11:00, January 27, 2016

Investigations inside PCV	1st (Jan 2012)	- Acquiring images - Measuring air temperature
	2nd (Mar 2012)	- Confirming water surface - Measuring water temperature - Measuring dose rate
	3rd (Feb 2013 – Jun 2014)	- Acquiring images - Sampling accumulated water - Measuring water level - Installing permanent monitoring instrumentation
Leakage points from PC	- No leakage from torus room rooftop - No leakage from all inside/outside surfaces of S/C	

Investigative results on torus room walls

- The torus room walls were investigated (on the north side of the east-side walls) using equipment specially developed for that purpose (a swimming robot and a floor traveling robot).
- At the east-side wall pipe penetrations (five points), "the status" and "existence of flow" were checked.
- A demonstration using the above two types of underwater wall investigative equipment showed how the equipment could check the status of penetration.
- Regarding Penetrations 1 - 5, the results of checking the sprayed tracer (*5) by camera showed no flow around the penetrations. (investigation by the swimming robot)
- Regarding Penetration 3, a sonar check showed no flow around the penetrations. (investigation by the floor traveling robot)

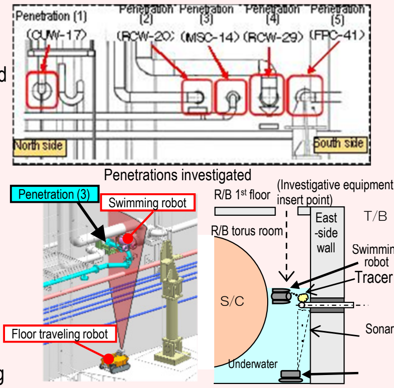


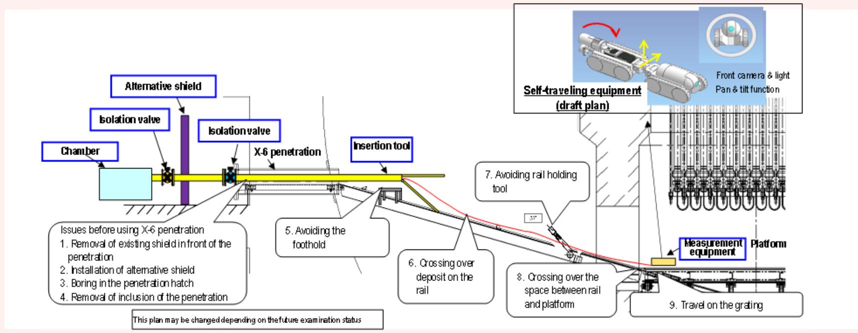
Image of the torus room east-side cross-sectional investigation

Status of equipment development toward investigating inside the PCV

Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigations inside the PCV are scheduled.

[Investigative outline]
- Inserting the equipment from Unit 2 X-6 penetration(*1) and accessing inside the pedestal using the CRD rail to conduct investigation.

[Status of investigative equipment development]
- Based on issues confirmed by the CRD rail status investigation conducted in August 2013, the investigation method and equipment design are currently being examined.
- As a portion of shielding blocks installed in front of X-6 penetration could not be moved, a removal method using small heavy machines was planned. The work for removing these blocks resumed on September 28, 2015 and removal of interfering blocks for future investigations was also completed on October 1, 2015.
- To start the investigation into the inside of PCV, dose on the floor surface in front of X-6 penetration needs to be reduced to approx. 100 mSv/h. As the dose was not decreased to the target level through decontamination (removal of eluted materials, decontamination by steam, chemical decontamination, surface grind), dose reduction methods including anti-dust scattering measures will be re-examined. Investigations inside the PCV will be conducted according to the decontamination status.



Investigative issues inside the PCV and equipment configuration (draft plan)

<Glossary>
(*1) Penetration: Through-hole of the PCV
(*2) SFP (Spent Fuel Pool)
(*3) RPV (Reactor Pressure Vessel)
(*4) PCV (Primary Containment Vessel)
(*5) Tracer: Material used to trace the fluid flow. Clay particles

Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

January 28, 2016
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

Immediate target	Identify the plant status and commence R&D and decontamination toward fuel debris removal

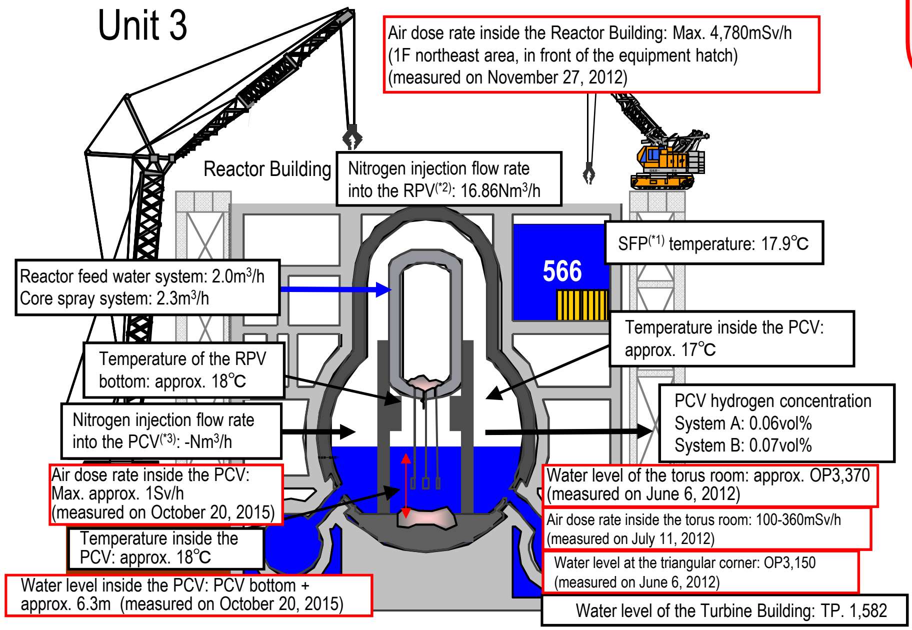
Water flow was detected from the Main Steam Isolation Valve* room

On January 18, 2014, a flow of water from around the door of the Steam Isolation Valve room in the Reactor Building Unit 3 1st floor northeast area to the nearby floor drain funnel (drain outlet) was detected. As the drain outlet connects with the underground part of the Reactor Building, there is no possibility of outflow from the building.

From April 23, 2014, image data has been acquired by camera and the radiation dose measured via pipes for measurement instrumentation, which connect the air-conditioning room on the Reactor Building 2nd floor with the Main Steam Isolation Valve Room on the 1st floor. On May 15, 2014, water flow from the expansion joint of one Main Steam Line was detected.

This is the first leak from PCV detected in the Unit 3. Based on the images collected in this investigation, the leak volume will be estimated and the need for additional investigations will be examined. The investigative results will also be utilized to examine water stoppage and PCV repair methods.

* Main Steam Isolation Valve: A valve to shut off the steam generated from the Reactor in an emergency

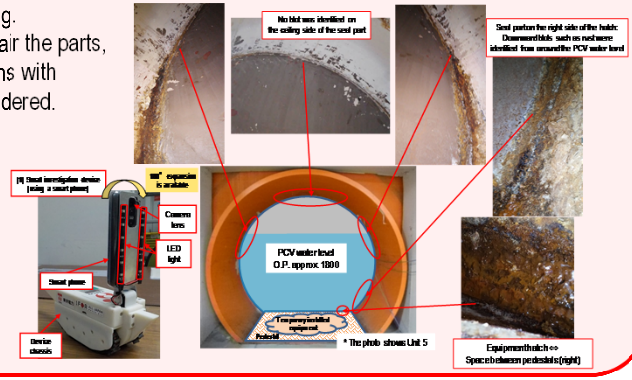


* Indices related to plant are values as of 11:00, January 27, 2016

Investigations inside PCV	1st (Oct – Dec 2015)	- Acquiring images - Measuring air temperature and dose rate - Measuring water level and temperature - Sampling accumulated water - Installing permanent monitoring instrumentation (scheduled for December 2015)
Leakage points from PC	- Main steam pipe bellows (identified in May 2014)	

Investigative results into the Unit 3 PCV equipment hatch using a small investigation device

- As part of the investigation into the PCV to facilitate fuel debris removal, the status around the Unit 3 PCV equipment hatch was investigated using a small self-traveling investigation device on November 26, 2015.
- Given blots such as rust identified below the water level inside the PCV, there may be a leakage from the seal to the extent of bleeding. Methods to investigate and repair the parts, including other PCV penetrations with a similar structure, will be considered.



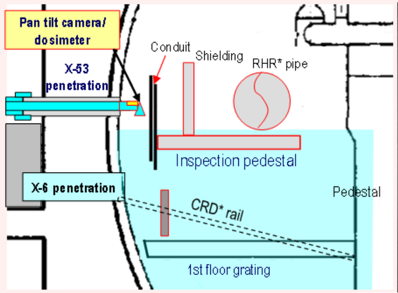
Investigation inside the PCV

Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV) including the location of the fuel debris, investigation inside the PCV was conducted.

[Steps for investigation and equipment development]

Investigation from X-53 penetration(*4)

- From October 22-24, the status of X-53 penetration, which may be under the water and which is scheduled for use to investigate the inside of the PCV, was investigated using remote-controlled ultrasonic test equipment. Results showed that the penetration is not under the water.
- For the purpose of confirming the status inside the PCV, an investigation device was inserted into the PCV from X-53 penetration on October 20 and 22, 2015 to obtain images, data of dose and temperature and sample accumulated water. No damage was identified on the structure and walls inside the PCV and the water level was almost identical with the estimated value. In addition, the dose inside the PCV was confirmed to be lower than in other Units.
- In the next step, the obtained information will be analyzed to be utilized in the consideration about the policy for future fuel debris removal.



Inspection pedestal and water surface

<Glossary>
(*1) SFP (Spent Fuel Pool)
(*2) RPV (Reactor Pressure Vessel)
(*3) PCV (Primary Containment Vessel)
(*4) Penetration: Through-hole of the PCV

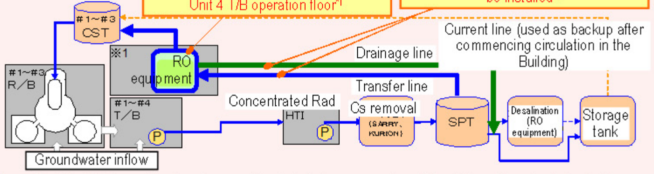
Progress toward decommissioning: Work related to circulation cooling and accumulated water treatment line

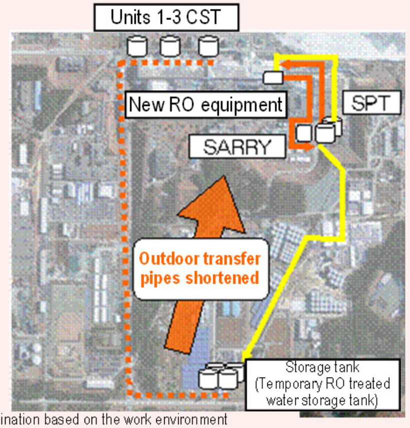
Immediate target	Stably continue reactor cooling and accumulated water treatment, and improve reliability

Work to improve the reliability of the circulation water injection cooling system and pipes to transfer accumulated water.

- Operation of the reactor water injection system using Unit 3 CST as a water source commenced (from July 5, 2013). Compared to the previous systems, in addition to the shortened outdoor line, the reliability of the reactor water injection system was enhanced, e.g. by increasing the amount of water-source storage and enhancing durability.
- By newly installing RO equipment inside the Reactor Building, the reactor water injection loop (circulation loop) will be shortened from approx. 3km to approx. 0.8km*.

* The entire length of contaminated water transfer pipes is approx. 2.1km, including the transfer line of surplus water to the upper heights (approx. 1.3km).





*1 Unit 4 T/B operation floor is one of the installation proposals, which will be determined after further examination based on the work environment
*2 A detailed line configuration will be determined after further examination

Dismantling of flange tanks completed in H1 east area

- To facilitate replacement of flange tanks, dismantling of flange tanks started in H1 east/H2 areas in May 2015. Dismantling of all flange tanks (12 tanks) in H1 east area was completed in October 2015. The work continues in H2 area.

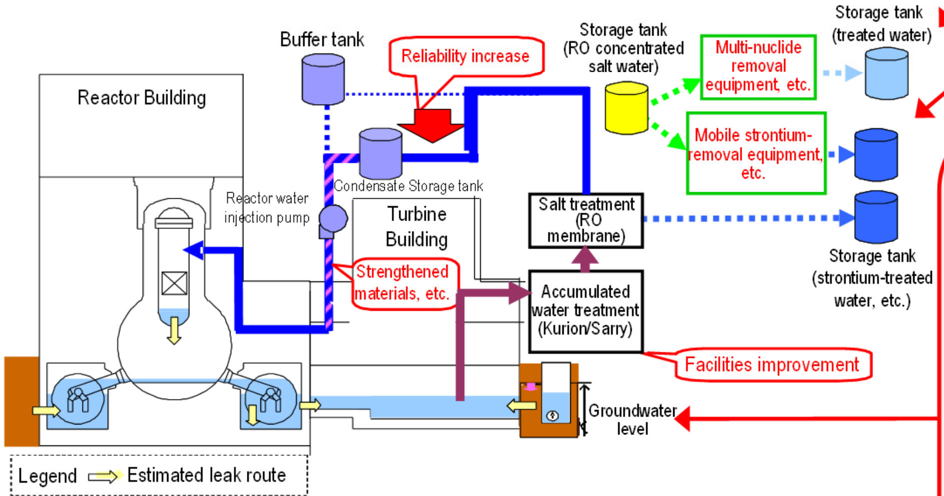

When dismantling started

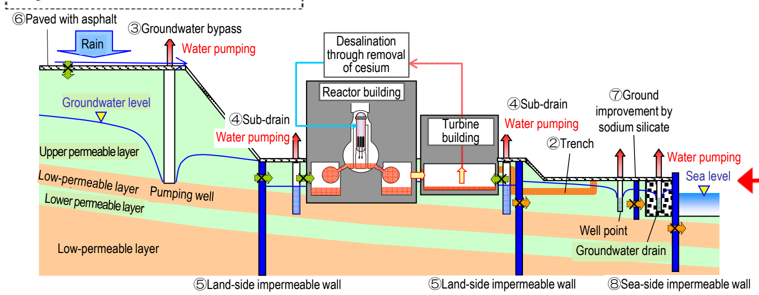

After dismantling

Completion of purification of contaminated water (RO concentrated salt water)

Contaminated water (RO concentrated salt water) is being treated using seven types of equipment including the multi-nuclide removal equipment (ALPS). Treatment of the RO concentrated salt water was completed on May 27, 2015, with the exception of the remaining water at the tank bottom. The remaining water will be treated sequentially toward dismantling the tanks.

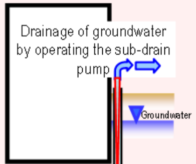
The strontium-treated water from other facilities than the multi-nuclide removal equipment will be re-purified in the multi-nuclide removal equipment to further reduce risks.





Land-side impermeable wall

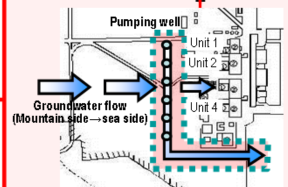
Preventing groundwater from flowing into the Reactor Buildings



Reducing groundwater inflow by pumping sub-drain water

To reduce groundwater flowing into the buildings, pumping-up of groundwater from wells (subdrains) around the buildings started on September 3, 2015. Pumped-up groundwater was purified at dedicated facilities and released after TEPCO and a third-party organization confirmed that its quality met operational targets.

Via a groundwater bypass, reduce the groundwater level around the Building and groundwater inflow into the Building



Measures to pump up groundwater flowing from the mountain side upstream of the Building to reduce the groundwater inflow (groundwater bypass) have been implemented.

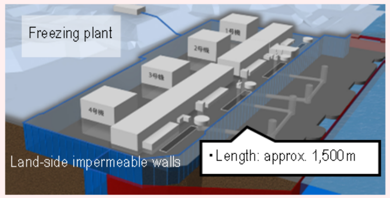
The pumped up groundwater is temporarily stored in tanks and released after TEPCO and a third-party organization have confirmed that its quality meets operational targets.

Through periodical monitoring, pumping of wells and tanks is operated appropriately.

At the observation holes installed at a height equivalent to the buildings, the trend showing a decline in groundwater levels is checked.

The analytical results on groundwater inflow into the buildings based on existing data showed a declining trend.

Installing land-side impermeable walls around Units 1-4 to prevent the inflow of groundwater into R/B



To prevent the inflow of groundwater into the Reactor Buildings, installation of impermeable walls on the land side is planned.

Drilling holes to install frozen pipes commenced from June 2, 2014.

Construction on the mountain side was completed in September 2015.

Construction on the sea side will be completed in February 2016.

<Glossary>
(*1) CST (Condensate Storage Tank)
Tank for temporarily storing water used in the plant.

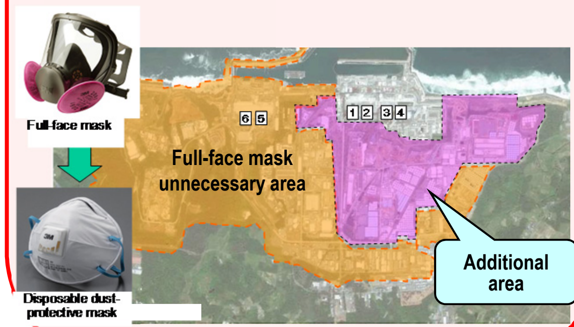
Progress toward decommissioning: Work to improve the environment within the site

Immediate targets	・Reduce the effect of additional release from the entire power station and radiation from radioactive waste (secondary water treatment waste, rubble, etc.) generated after the accident, to limit the effective radiation dose to below 1mSv/year at the site boundaries. ・Prevent contamination expansion in sea, decontamination within the site

Expansion of full-face mask unnecessary area

As the number of continuous dust monitors has increased to ten with additional monitors installed in Units 3 and 4 slopes and tank areas, the full-face mask unnecessary area was expanded to approx. 90% of the site from May 29, 2015.

However, wearing full- or half-face mask is required for works exposed to highly concentrated dust; and full-face masks, for works involving a risk of ingesting concentrated salt water, etc.



Full-face mask unnecessary area

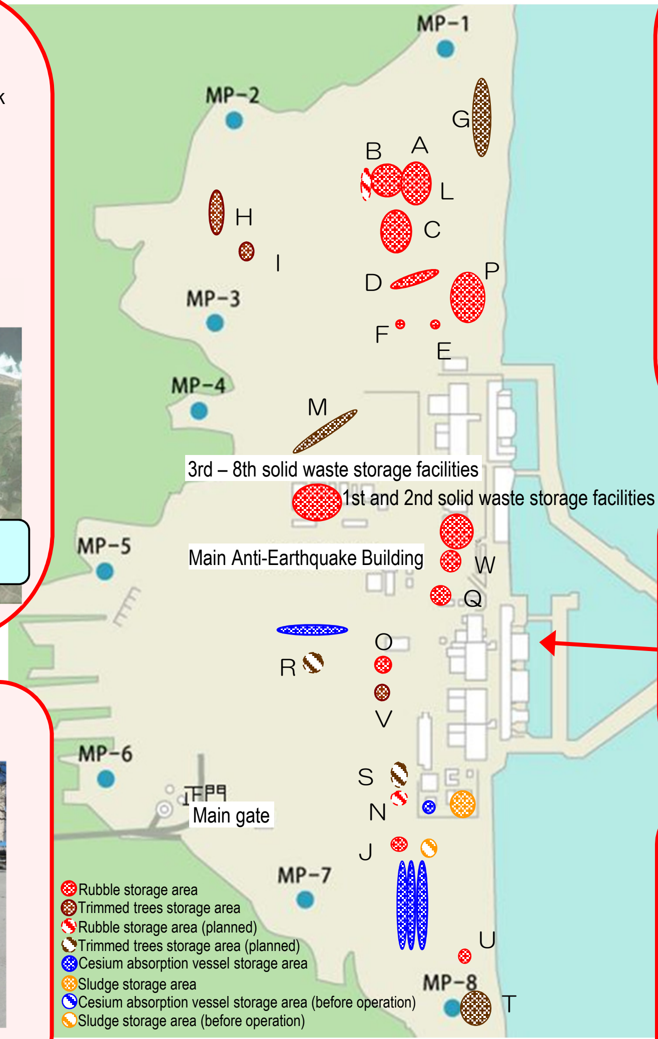
Installation of dose-rate monitors

To help workers in the Fukushima Daiichi Nuclear Power Station precisely understand the conditions of their workplaces, a total of 86 dose-rate monitors were installed by January 4, 2016.

These monitors allow workers to confirm real time on-site dose rates at their workplaces.

Workers are also able to check concentrated data through large-scale displays installed in the Main Anti-Earthquake Building and the access control facility.

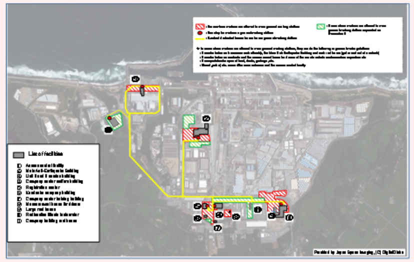
Installation of Dose-rate monitor



Expansion of areas where workers are allowed to wear general workwear

From December 8, 2015, in addition to newly adding the Radioactive Waste Incinerator, areas of the Main Anti-Earthquake Building, rest houses of the company building, and parking were expanded as those where workers are allowed to wear general workwear.

With this expansion, workers can move in general workwear from the access control facility to each rest house around the company building.



Installation of sea-side impermeable walls

To prevent the outflow of contaminated water into the sea, sea-side impermeable walls have been installed.

Following the completed installation of steel pipe sheet piles on September 22, 2015, connection of these piles was conducted and connection of sea-side impermeable walls was completed on October 26, 2015. Through these works, closure of sea-side impermeable walls was finished and the contaminated water countermeasures have been greatly advanced.

Installation of steel pipe sheet piles for sea-side impermeable wall

Operation start of the large rest house

A large rest house for workers was established and its operation commenced on May 31, 2015.

Spaces in the large rest house are also installed for office work and collective worker safety checks as well as taking rest.

Meal service at the dining space, which had been temporarily suspended due to the construction to ensure further improvement from a hygiene perspective, resumed on August 3, 2015.