Summary of Decommissioning and Contaminated Water Management

May 28, 2015

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. 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

Unit 1&2 / Unit 3 → Rubble removal & dose reduction → Installing FHM* → Fuel removal → Unit 4 → Storage and handling

Unit 1: Fuel removal to start FY2017 (under consideration)
Unit 2: Fuel removal to start After FY2017 (under consideration)
Unit 3: Fuel removal to start FY2015 (scheduled)
Unit 4: Fuel removal completed 2014

FHM*: Fuel-Handling Machine

Fuel Debris (Corium) Removal

Unit 1-3 → Dose reduction & Leakage identification → Stop leakage → Fuel debris removal → Storage and handling

After FY2017
Water stoppage of PCV lower part (under consideration)

Dismantling Facilities

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

Fuel removal from SFP

Toward fuel removal from Unit 3 SFP, large rubble within the pool is being removed.

Though removal of large rubble within Unit 3 SFP had been suspended since the fall of rubble in August 2013, it has resumed since December 2014 after implementing additional fall-prevention measures.

(Mar 6, 2015: Removal of fuel-handling machine west-side frame)

Three principles behind contaminated water countermeasures

Water to cool fuel having melted in the accident is mixed with ground water and approx. 300 tons of contaminated water is generated every day.
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 2)

(Note 2) Underground tunnel containing pipes.

2. Isolate water from contamination

③ Pump up ground water for bypassing

④ Pump up ground water near buildings

⑤ Land-side impermeable walls

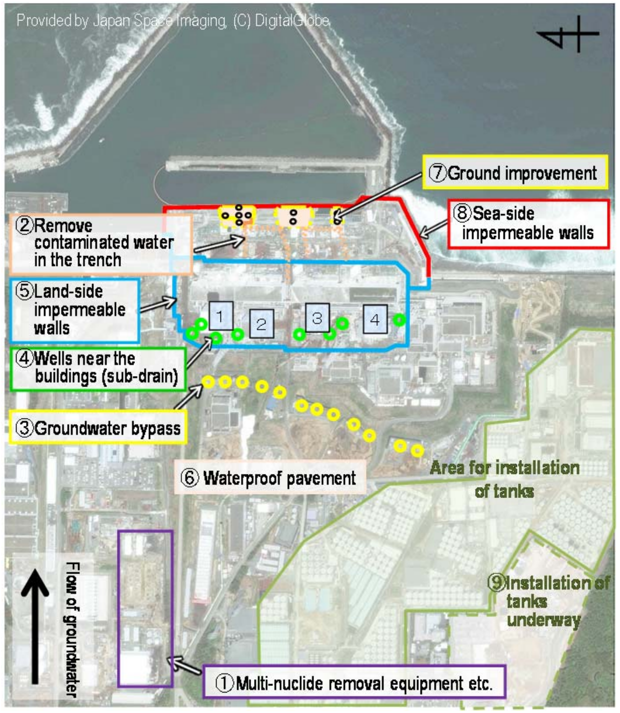
⑥ Waterproof pavement

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.
- In addition to multi-nuclide removal equipment, contaminated water is treated by installing additional multi-nuclide removal equipment by TEPCO (operation commenced in September 2014) and a subsidy project of the Japanese Government (operation commenced in October 2014).
- To reduce the risks of contaminated water, treatment is administered through multiple purification systems to remove strontium.

(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.
- Regarding work on the mountain side, which will commence preceding freezing, the installation of frozen pipes is approx. 99% completed.
- A coolant functioning test started at the end of April 2015.

(Land-side impermeable walls example of coolant functioning test point)

Sea-side impermeable walls

- The walls aim to prevent the flow of contaminated groundwater into the sea.
- The installation of steel sheet piles is almost (98%) complete. The closure time is being coordinated.

(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. 15-50°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 The radiation exposure dose due to the release of radioactive materials from the Reactor Buildings in April 2015 was evaluated as less than 0.0027 mSv/year at the site boundaries. This is approx. 1/70 of the annual radiation dose by natural radiation (annual average in Japan: approx. 2.1 mSv/year).

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, with the exception of the remaining water at the tank bottom.

The remaining water will be treated sequentially as the tanks are dismantled.

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.

Commencement of dismantling of Unit 1 building cover

To remove the fuel from Unit 1, the building cover must be dismantled and rubble must be removed from the rooftop of the reactor building.

Before starting the dismantling work, anti-scattering agent was sprayed through the penetration of the roof panels from May 15-20.

Disconnect was found with the balloon installed to reduce the release of radioactive materials. Countermeasures will be taken before removing the roof panels.

<Spray of anti-scattering agent>

Status of freezing functioning test of land-side impermeable walls

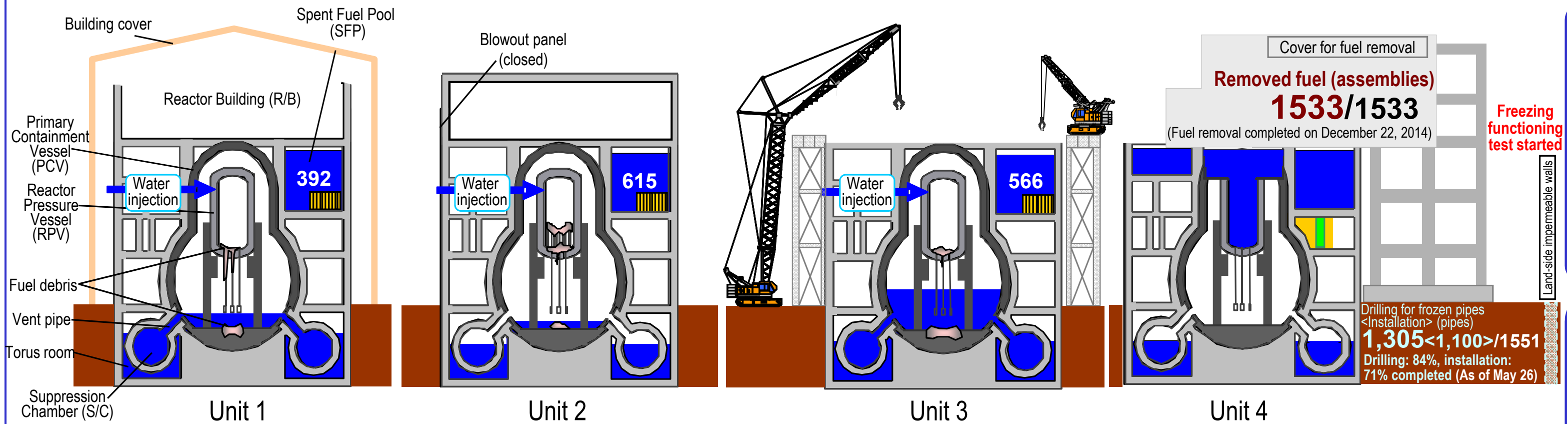
From April 30, the freezing functioning test started at 18 points (58 frozen pipes, approx. 6% on the mountain side).

This test is to confirm the facility-wide operation status through freezing temperature circulated in frozen pipes, etc. as well as points to consider during the full-scale operation through earth temperature.

Update of "Notification Standard and Announcement Method" related to troubles

TEPCO updated the "Notification Standard and Announcement Method" formulated to promptly deliver precise information related to troubles, etc. based on progress of decommissioning and its usage performance to date. The updated standard and method came into effect from May 12.

TEPCO will continue to deliver appropriate information promptly.



Progress toward revising the Mid-long term road map

On May 21, a meeting of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment was held to announce a draft revision plan.

After preparing specific target process and hearing views from related local parties and experts, the revision will proceed as early as possible.

Investigative results inside the Unit 1 reactor

To gain an insight into the status of fuel debris in the Unit 1 reactor, its position was measured using muons (a type of elementary particle), which are derived from cosmic radiation, from February 12 to May 19.

The accumulated data through the measurement over approx. three months reduced statistical error and quantitatively confirmed the absence of a large fuel block at the core location.

Wet spot at the H3 area tank bottom

On May 1, wet spot was detected near the bottom of the H3 area B2 tank (a tank at which high-density points had been confirmed in the past). Water had passed through this tank to treat contaminated water in the H3 area in the multi-nuclide removal equipment.

Immediately after detecting the wet spot, treatment of contaminated water in H3 area was switched to a form that does not traverse the relevant tank.

Countermeasures for the wet spot were completed and no wet spot was detected outside the fences.

Operation start of the large rest house

A large rest house for workers was established and its operation will commence on May 31.

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

The facility is also equipped with a dining room (operation will commence on June 1) and shop.

<Large rest house>

Measures to prevent heat stroke

Rules to prevent heat stroke, defined based on increased heat stroke cases, have been communicated and enforced since May 2015 to ensure prevention.

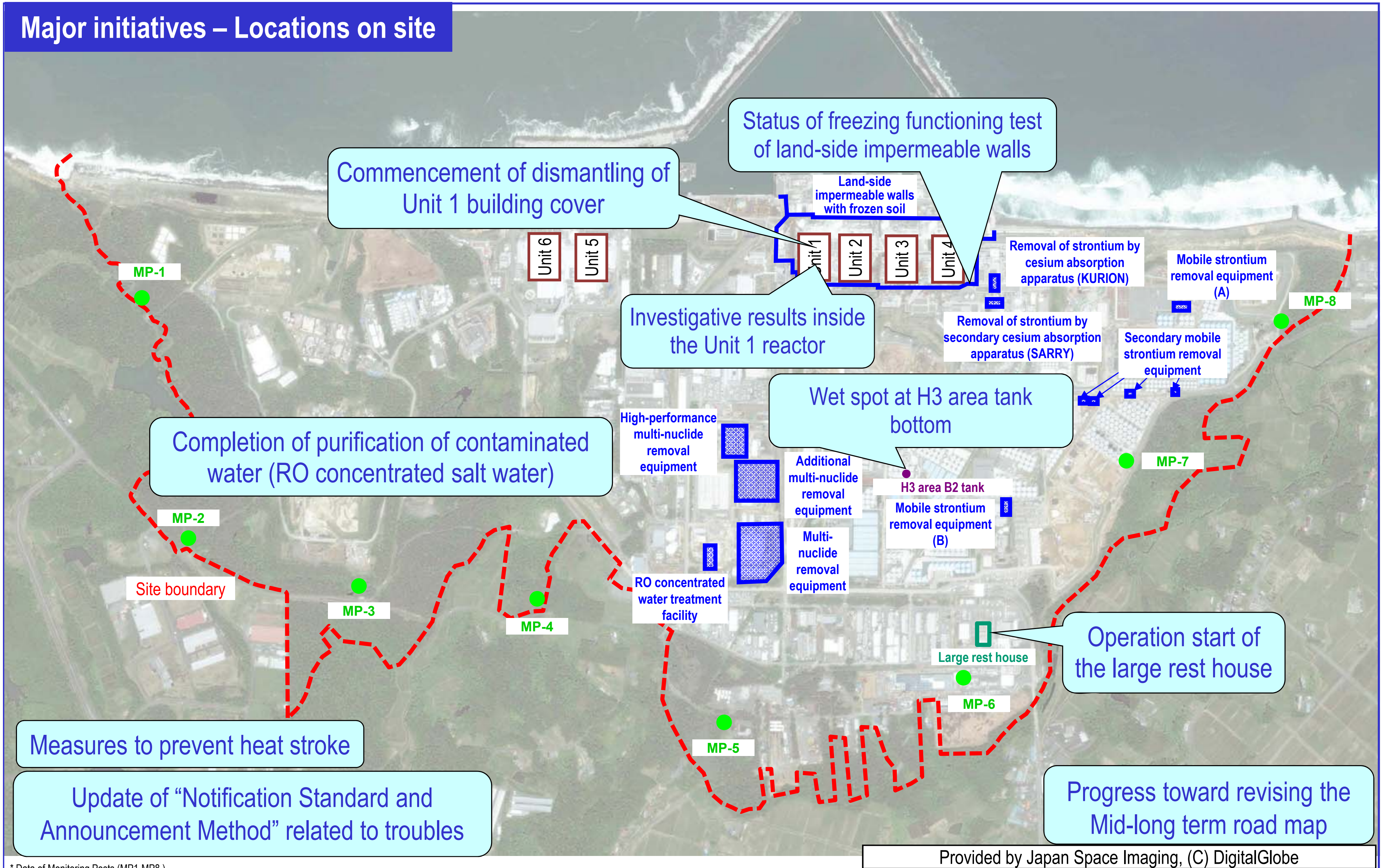
○ Major rules to prevent heat stroke

- Work under the blazing sun is prohibited in principle (from 14:00 to 17:00 from July to September)
- Work is limited using WBGT Note)
- Mobile water supply sites (five units) are installed

Note) WBGT: Index using three perspectives of humidity, radiation heat, and temperature which significantly impact on the heat balance of human bodies

<Image of mobile water supply site>

Major initiatives – Locations on site



* Data of Monitoring Posts (MP1-MP8.)

Data of Monitoring Posts (MPs) measuring airborne radiation rate around site boundaries show 0.992 - 3.998 μSv/h (April 28 – May 26, 2015).

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.

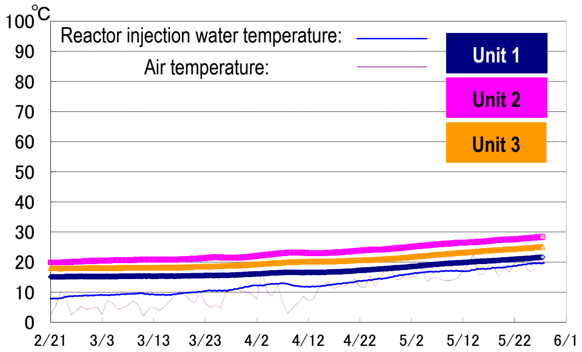
The radiation shielding panel around monitoring post No. 6, which is one of the instruments used to measure the radiation dose of the power station site boundary, were taken off from July 10-11, 2013, since the surrounding radiation dose has largely fallen down due to further cutting down of the forests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

We are improving the measurement conditions of monitoring post 8 and construction works such as pavement of roads is being implemented from February 18 until around late May, 2015 and the airborne radiation rate around the monitoring post is decreasing.

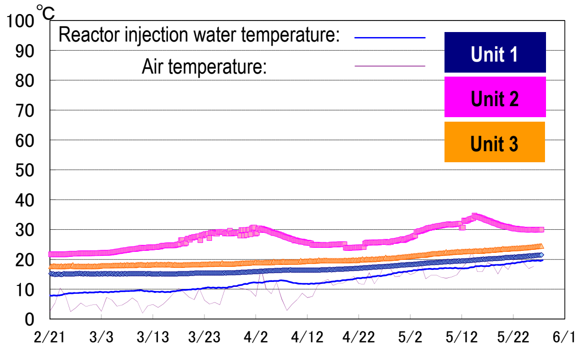
I. Confirmation of the reactor conditions

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 50°C for the past month, though they vary depending on the unit and location of the thermometer.



RPV bottom temperatures (recent quarter)



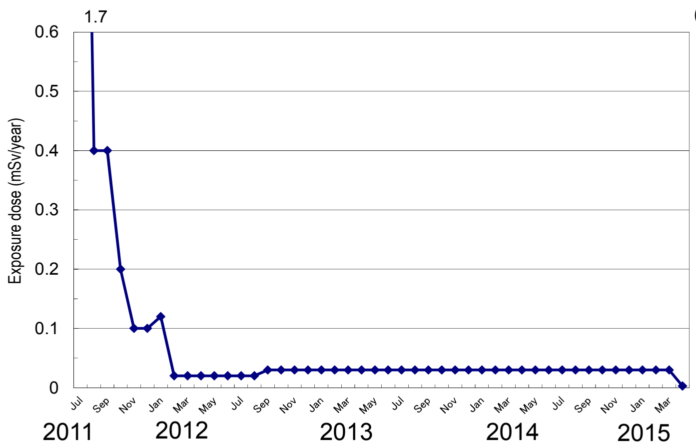
PCV gas phase temperatures (recent quarter)

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

2. Release of radioactive materials from the Reactor Buildings

As of April 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. 7.8×10^{-11} Bq/cm³ for Cs-134 and 2.2×10^{-10} Bq/cm³ for Cs--137. The radiation exposure dose due to the release of radioactive materials was less than 0.0027 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 x 10^{-5} Bq/cm³
  [Cs-137]: 3 x 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 x 10-7 Bq/cm³)
  [Cs-137]: ND (Detection limit: approx. 2 x 10-7 Bq/cm³)*
- * Data of Monitoring Posts (MP1-MP8).
  Data of Monitoring Posts (MPs) measuring the airborne radiation rate around site boundaries showed 0.992 - 3.998 μSv/h (April 28-May26).
  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 of cold shutdown condition or sign of criticality 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. Reactor cooling plan

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

➢ Reinstallation of the water level gauge and thermometer inside Unit 1 PCV

- To investigate inside the PCV, the permanent supervisory instrumentation (thermometer and water level gauge) installed there was removed (April 7). Following completion of the investigation (April 20), the permanent supervisory instrumentation was reinstalled (April 22-23).
- The investigative results confirmed that the water level inside the PCV was approx. OP.8700, approx. 350mm decrease from the level of the previous measurement (approx. OP.9050) (October 2012). The decrease in the water level was attributable to the reduced volume of water injected into the reactor after the previous measurement (from November 2012), which had no impact on the cooling status.
- Alignment of the water level inside the PCV and the behavior of the water level gauge was confirmed during installation, which proved that it had been installed correctly.

2. Accumulated water-treatment plan

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 commenced 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 May 27, 105,046m³ of groundwater had been released. The pumped up groundwater has been temporarily stored in tanks and released after TEPCO and a third-party organization (Japan Chemical Analysis Center) confirmed that its quality met operational targets.
- It was confirmed that the groundwater inflow into the buildings had decreased by approx. 90 m³/day, based on the evaluation data to date, through measures such as groundwater bypass and water stoppage of the High Temperature Incinerator Building (HTI) (see Figure 1).
- It was confirmed that the groundwater level at the observation holes had decreased by approx. 10-20 cm compared to the level before pumping at the groundwater bypass started.
- Due to a decrease in the flow rate of pumping well Nos. 8, 10 and 12, water pumping was suspended for cleaning (No. 8: from May 22, No. 10: from April 27, No. 12 from May 25).

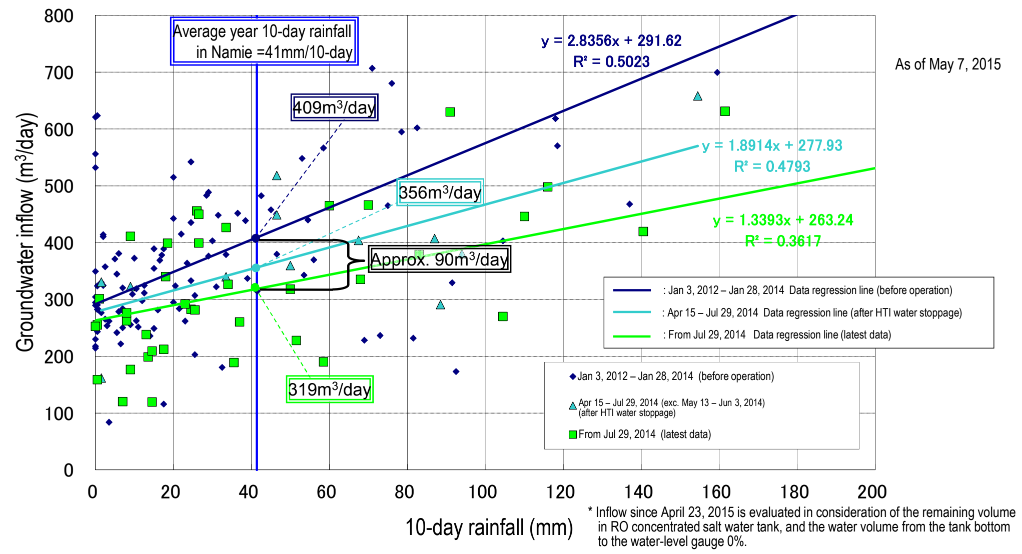


Figure 1: Analytical results of inflow into buildings

Construction status of 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 which will be frozen first, as of May 26, drilling at 1,249 points (approx. 99%, for frozen pipes: 1,025 of 1,036 points, for temperature-measurement pipes: 224 of 228 points) and installation of frozen pipes at 1,025 of 1,036 points (approx. 99%) had been completed (see Figure 3). The remaining construction will proceed after the necessary procedures have been performed.
- From April 30, the freezing functioning test started at 18 points (58 frozen pipes, approx. 6% on the mountain side). The test confirmed that the facilities were operating correctly, the temperature of brine delivery was stable at around -30°C and the earth temperature around the frozen pipes were appropriate according to their locations.

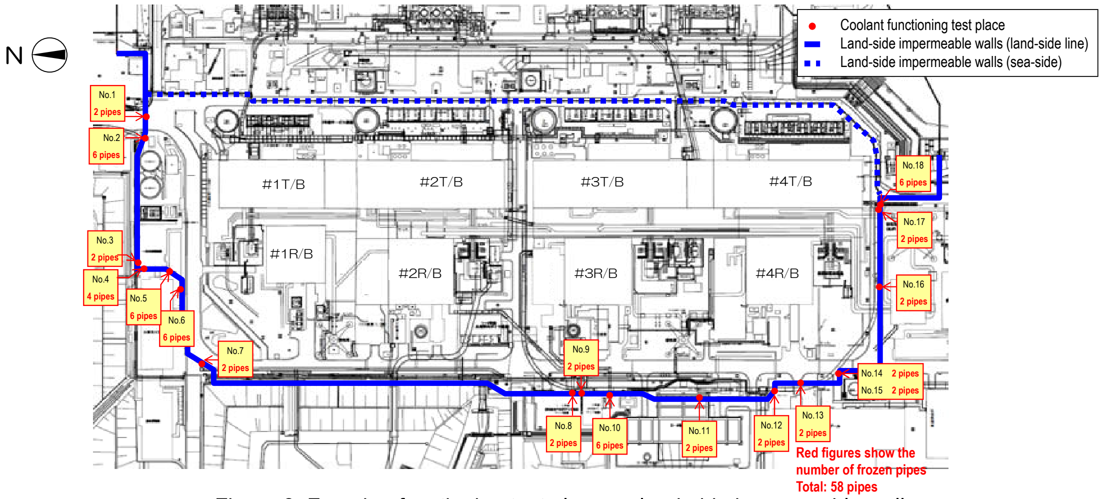


Figure 2: Freezing functioning test place on land-side impermeable walls

T/Mt pipes: Temperature-measurement pipes

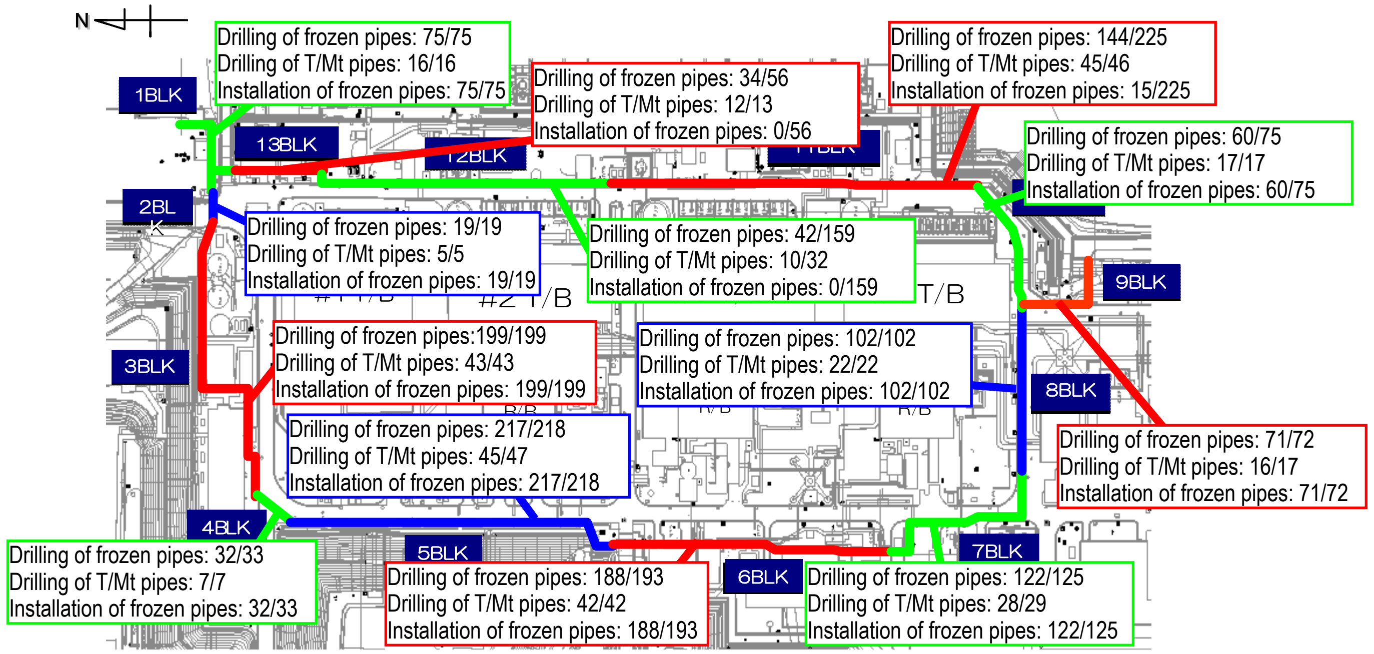


Figure 3: Drilling status for frozen-soil impermeable walls and installation of frozen pipes

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 May 21, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 252,000, 132,000 and 56,000 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).
- To reduce the risks of strontium-treated water, treatment by high-performance multi-nuclide removal equipment is underway (from April 15). As of May 21, approx. 10,000 m³ had been treated.

Toward reducing the risk of contaminated water stored in tanks

- Purification of RO concentrated salt water via RO concentrated water treatment equipment was conducted (from January 10 to May 27). As of May 21, approx. 73,000 m³ had been treated.
- To purify the RO concentrated salt water, mobile strontium-removal equipment was also operated (G4 south area: from October 2, 2014 to February 28; H5 north area: from February 10 to March 31; G6 south area: from February 28 to March 31). To further reduce risks, the purification of strontium-treated water continued until May 27.
- The secondary mobile strontium-removal equipment (a total of four units) was operated for treatment (C area: from February 20 to March 31, G6 area: from February 20 to March 31). To further reduce risks, the purification of strontium-treated water continued until May 27.
- Treatment measures comprising the removal of strontium by cesium absorption apparatus (KURION) (from January 6) and secondary cesium absorption apparatus (SARRY) (from December 26, 2014) are underway. As of May 21, approx. 53,000 m³ had been treated.

Status of contaminated water purification

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

Accumulated water detected around the outer periphery of the HIC hatch

- Accumulated water was detected around the outer periphery of a High-Integrity Container (HIC)(note) hatch and on the floor inside the box culvert containing the HIC during regular inspection for any leakage from HIC (April 2). Sampling results showed that the accumulated water was contaminated.

Note: High Integrity Container (HIC): A container storing sediment products (slurry) and spent adsorbent generated from the pre-treatment facilities and absorption vessels of the multi-nuclide removal equipment, etc.

- It was assumed that hydrogen gas, which was generated through radiolysis of water in the carbonate slurry, stayed and accumulated in the slurry, bloated the slurry volume and consequently increased the water level and the supernatant fluid was accumulated.
- As it is considered that water accumulation can be prevented if there is 10% of space volume against the slurry contained in the HIC, the water level inside the HIC was changed to 8 inches (approx. 20cm) under the lower end of the hatch.

Wet spot at the bottom of the H3 area B2 tank

- On May 1, wet spot was detected near the bottom of H3 area B2 tank (a tank with which high-density points were confirmed in August 2013). Water had passed through this tank since April 18 to treat contaminated water in H3 area in the multi-nuclide removal equipment. The water was immediately removed from the tank, the wet spot portion was caulked and water suction materials and sandbags were installed.
- A temporary pump was inserted into this tank, through which water was removed up to around 10 cm above the bottom (May 7). Water was further removed up to around 1 cm above the bottom, the wet spot was cleaned off and the relevant portion of the tank surface was repainted (May 11).
- RO concentrated salt water in tanks located in the upper stream of H3 area B2 tank was directly transferred to B1 tank by a temporary pump inserted into B3 tank and treated in the multi-nuclide treatment equipment.

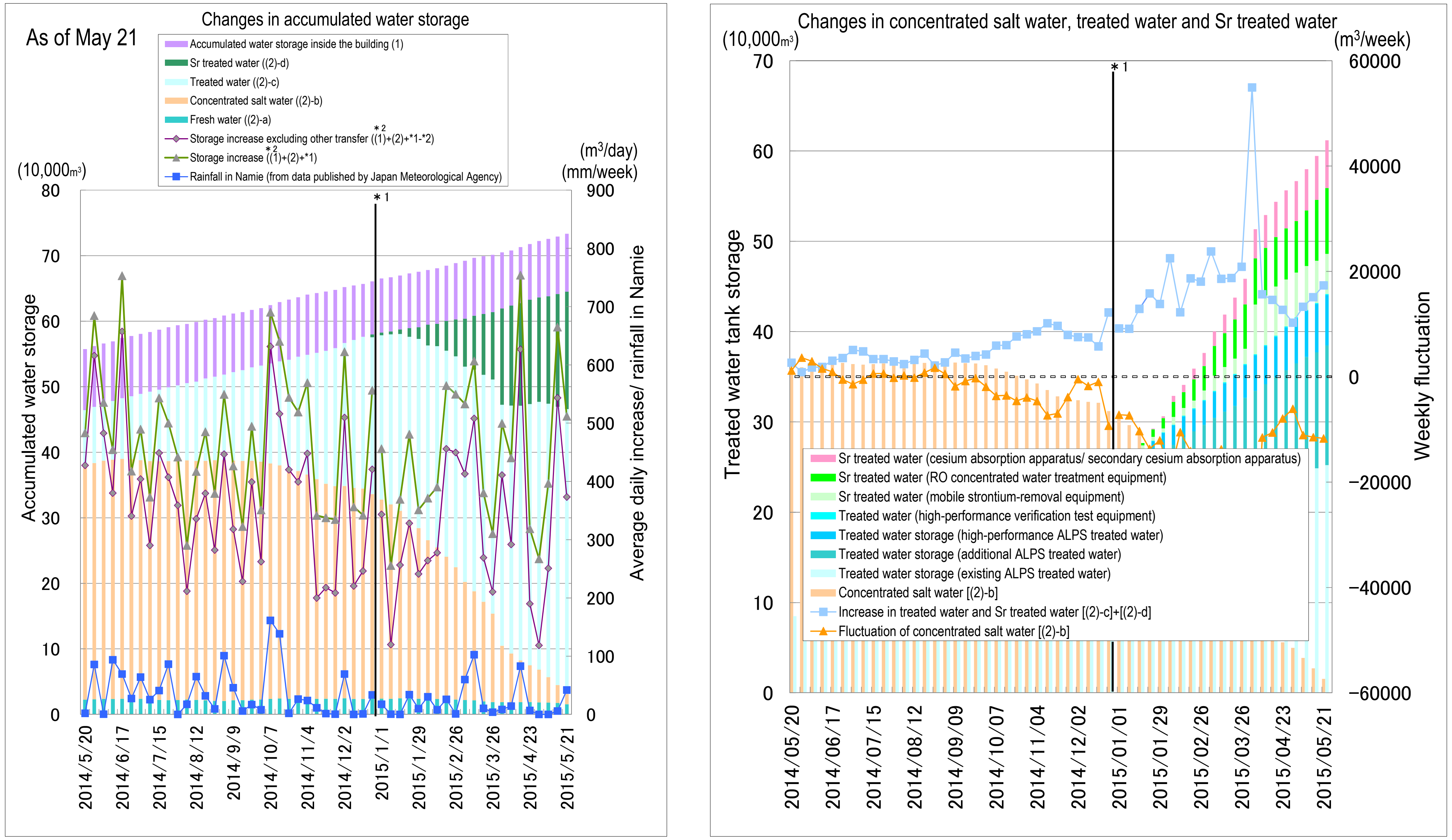


Figure 4: Status of accumulated water storage

*1: Since January 1, 2015, data collection days have been changed (Tuesdays → Thursdays)
*2: Since April 23, 2015, data collection method has been changed (Increase in storage: (1)+(2) → (1)+(2)+*1); increase in storage excluding other amounts transferred: (1)+(2)-*2 → (1)+(2)+*1-*2),

➢ 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 May 26, a total of 25,710 m³).

➢ Status of water pumping from the subdrain No. 16 pit

- From the subdrain No. 16 pit near Unit 2 Reactor Building, which was classified into the "measures required" category in the comprehensive risk review and for which additional urgent measures needed to be implemented, contaminated groundwater was pumped up (approx. 20 m³) (May 22-24). Improvement in the radioactive density inside the pit was confirmed.

➢ Removal of contaminated water from seawater-pipe trenches

- Regarding the Unit 2 seawater-pipe trench, filling of the tunnel sections was completed on December 18, 2014. Filling of Vertical Shafts A and D commenced on February 24, 2015. The first and second filling cycles were completed on April 7 and May 27 respectively.
- Regarding the Unit 3 seawater-pipe trench, filling of the tunnel sections had been completed (from February 5 to April 8). Water-pumping tests were conducted to verify the filling of these tunnel sections (April 16, 21 and 27), which confirmed the lack of communication in Tunnels A and B. Filling of Vertical Shafts D and A commenced on May 2 and 15 respectively.
- Regarding the Unit 4 seawater-pipe trench, filling of the tunnel sections had been completed (from February 14 to March 21). A water-pumping test was conducted on March 27, which confirmed the lack of communication with the building. Filling of opening apertures II and III was completed (from April 15-28).Regarding filling of the upper stream of drainage channels, filling holes need be created on the sea side of the partition walls. This work will be conducted after coordinating with other construction nearby. Opening apertures I will be filled when the contaminated water level of the building is reduced.
- Regarding the contaminated water removal from seawater-pipe trenches, approx. 60% had been completed (as of May 27).

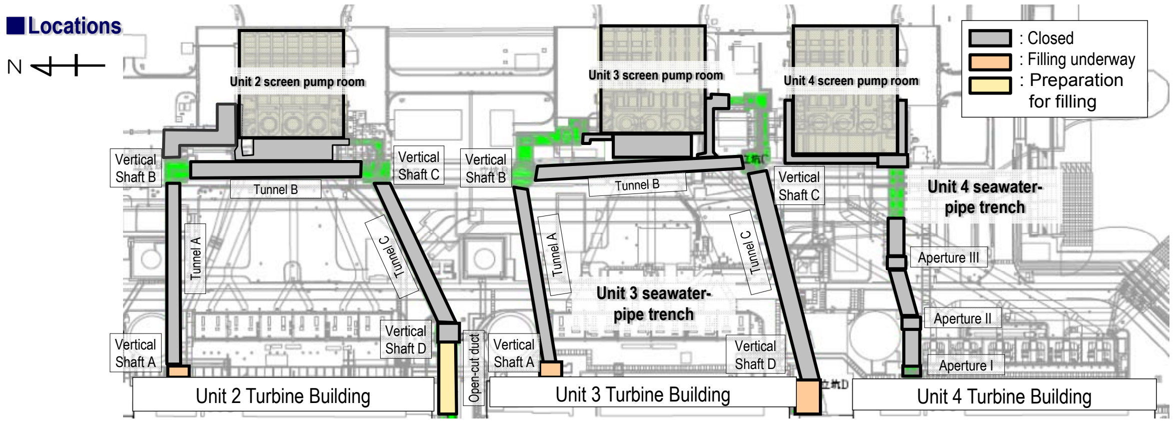


Figure 5: Progress status of contaminated water removal of seawater-pipe trenches

3. Plan to reduce radiation dose and mitigate contamination

Effective dose-reduction at site boundaries and purification of the 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 groundwater near the bank on the north side of the Unit 1 intake, tritium densities have been increasing in groundwater Observation Hole No. 0-4 since July 2014 and currently stand at around 25,000 Bq/L. Pumping of 1 m³/day of water from Observation Hole No. 0-3-2 continues.
- Regarding the groundwater near the bank between the Unit 1 and 2 intakes, the tritium density at groundwater Observation Hole Nos. 1 and 1-17 has maintained the same level at around 120,000 Bq/L since March 2015. The density of gross β radioactive materials at groundwater Observation Hole No. 1 has been increasing since February 2015 and currently stands at around 600 Bq/L, while the density at groundwater Observation Hole No. 1-17 has been decreasing and currently stands at around 5,000 Bq/L. Water pumping from the well point (10m³/day) and the pumping well No. 1-16 (P) (1m³/day) installed near Observation Hole No. 1-16 continues.
- Regarding radioactive materials in the groundwater near the bank between the Unit 2 and 3 intakes, the densities of tritium and gross β radioactive materials have been further decreasing from March and currently stand at around 500 Bq/L for both tritium and gross β radioactive materials. To treat the surface in the ground improvement area and repair the well point, the volume of water pumped from the well point increased to 50 m³/day (from October 31, 2014). The surface treatment commenced on January 8 and concluded on February 18. The repair of the well point is underway.
- Regarding the radioactive materials in groundwater near the bank between the Unit 3 and 4 intakes, a low density was maintained at all observation holes. Following the surface treatment in the ground improvement area (from March 19-31), pumping of rising groundwater commenced (20m³/day from April 1). Both densities of tritium and gross β radioactive materials have been increasing at groundwater Observation Hole No. 3 since April. The repair of the well point is underway.
- Regarding the radioactive materials in seawater outside the sea side impermeable walls and within the open channels of Units 1-4, a low density equivalent to that at the point north of the east breakwater was maintained as up to April.
- The density of radioactive materials in seawater within the port has been slowly declining as up to April.
- The radioactive material density in seawater at and outside the port entrance has remained within the same range as previously recorded.

➢ Facing plan

- There is a plan to complete approx. 1.35 million m² of facing within FY2015 (see Figure 9). In response to increasing risk of surface stream water in association with the wide-area facing, drainage channels will be installed and countermeasures for concentrated rain water will be implemented.

➢ Progress status of measures for drainage channels on site

- To reduce radiation density in drainage channels, main and branch drainage channels were cleaned (completed on April 24) and purification materials were installed (at 25 points, completed on March 30). For the large carry-in entrance rooftop of Unit 2 Reactor Building, where accumulated water with a relatively high density was detected, the contamination source was removed by April 16 followed by a finishing operation (scheduled for completion on May 28).

➢ Investigation and measures for accumulated water of Unit 1-3 drainage channels

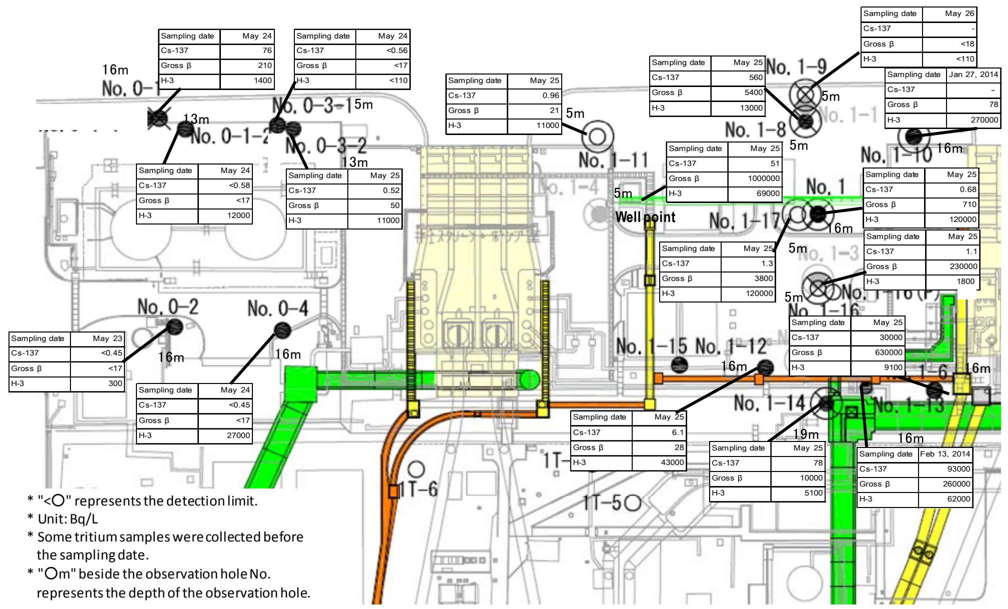
- In response to increased cesium density in the Unit 1 drainage channel after the typhoon in October 2014, fiber cesium absorbent was installed (in November 2014) as a measure pending the start of full-scale purification by mobile treatment equipment (scheduled for June), to confirm the purification status.
- In response to increased gross β density in accumulated water in the vertical shaft on the Unit 2 drainage channel upper stream side to 73,000 Bq/L, which was found by the regular sampling (monthly) on May 13, monitoring is being enhanced.

➢ Measures for alarm generation from B and C drainage channel side-ditch radiation monitor

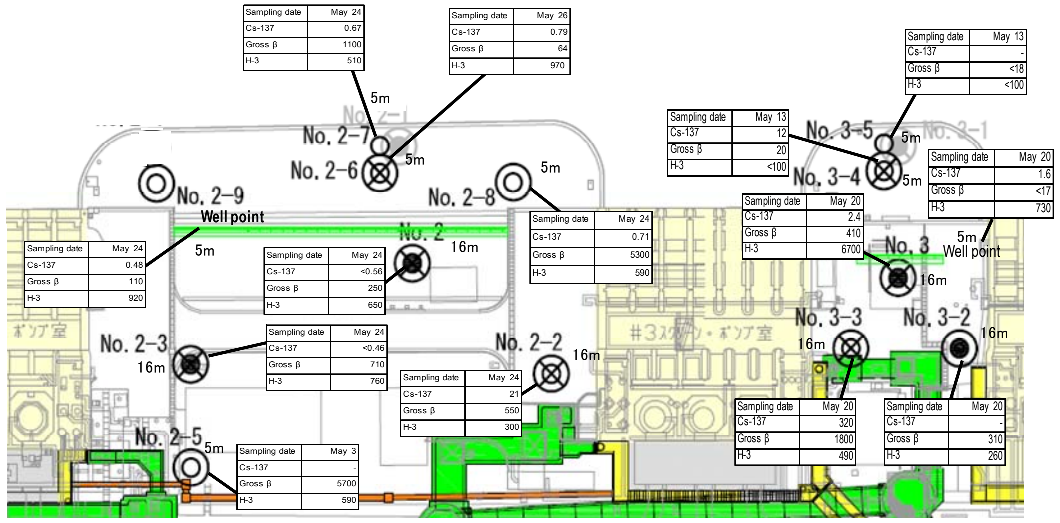
- On February 22, an alarm was generated from B and C drainage channel side-ditch radiation monitors. Though the investigation could not identify the inflow route of contaminated water, its results showed that it was not a leakage from the treatment facilities of contaminated water, etc. To prevent any similar recurrence, control related to high-density contaminated water has been enhanced. Additional measures will also be implemented from the perspective of more rapid response after alarm generation, early detection of leakage points and prevention of outflow inside the port.

➢ Investigation results of dust filter from the Unit 3 Reactor Building rooftop

- In response to the request from the Ministry of Agriculture, Forestry and Fisheries, dust filters sampled from the rooftop of Unit 3 Reactor Building on August 22, 2013 were investigated as follows and reported to the ministry.
- A portion of the dust filter where cesium was detected was cut out and observed with an electronic microscope. The investigative results confirmed three 25×34 μm particles containing 1-4 μm of cesium and one particle containing 1-2 μm of cesium. Elemental composition was analyzed at ten points, including relevant and nearby sites.
- The dissolution rate was also evaluated with rainwater added to the portion cut out of the dust filter. The results varied from less than 1.2 to 78.8%.



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



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

Figure 6: Groundwater density on the Turbine Building east side

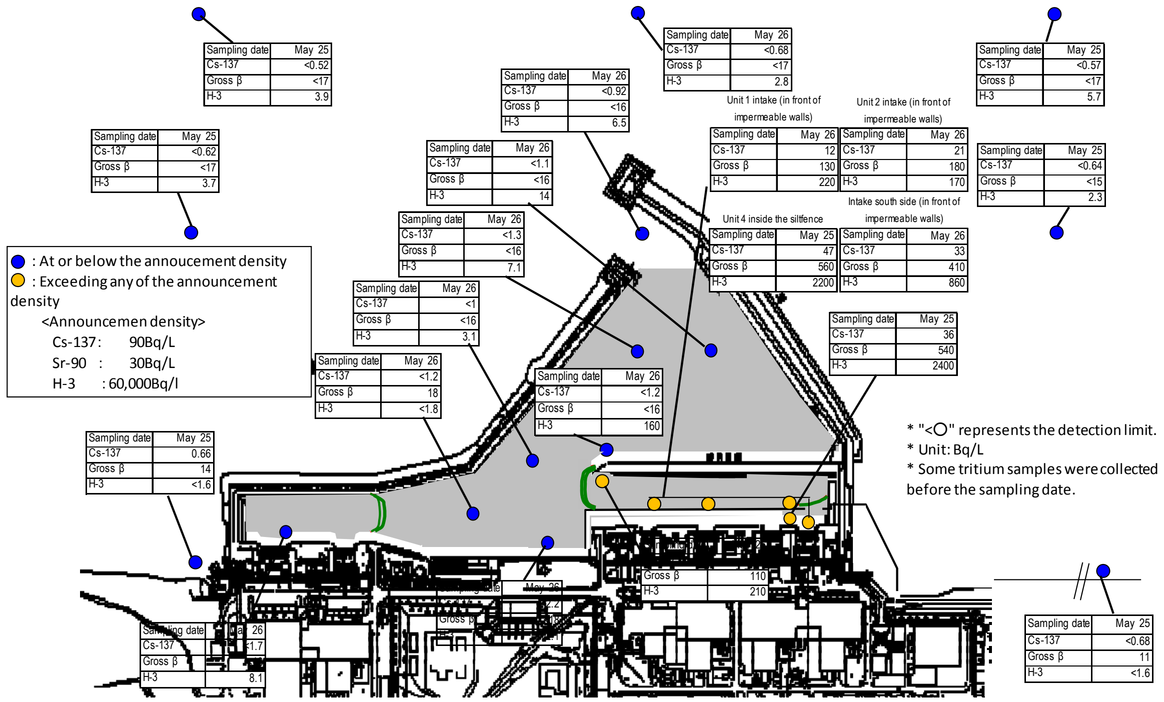


Figure 7: Seawater density around the port

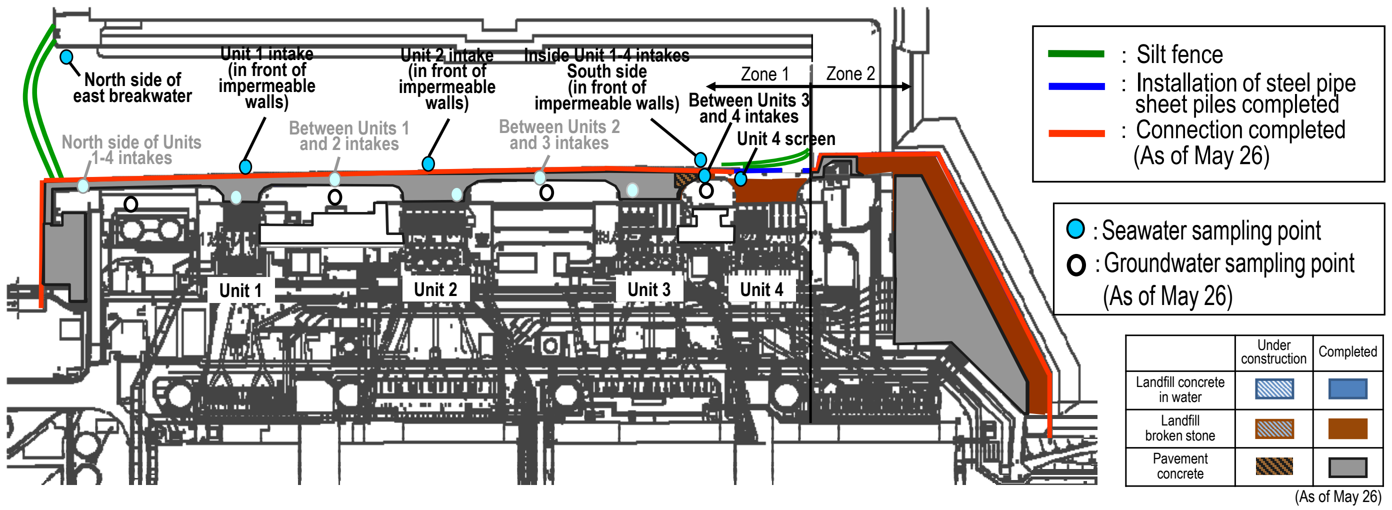


Figure 8: Progress status of impermeable walls on the sea side

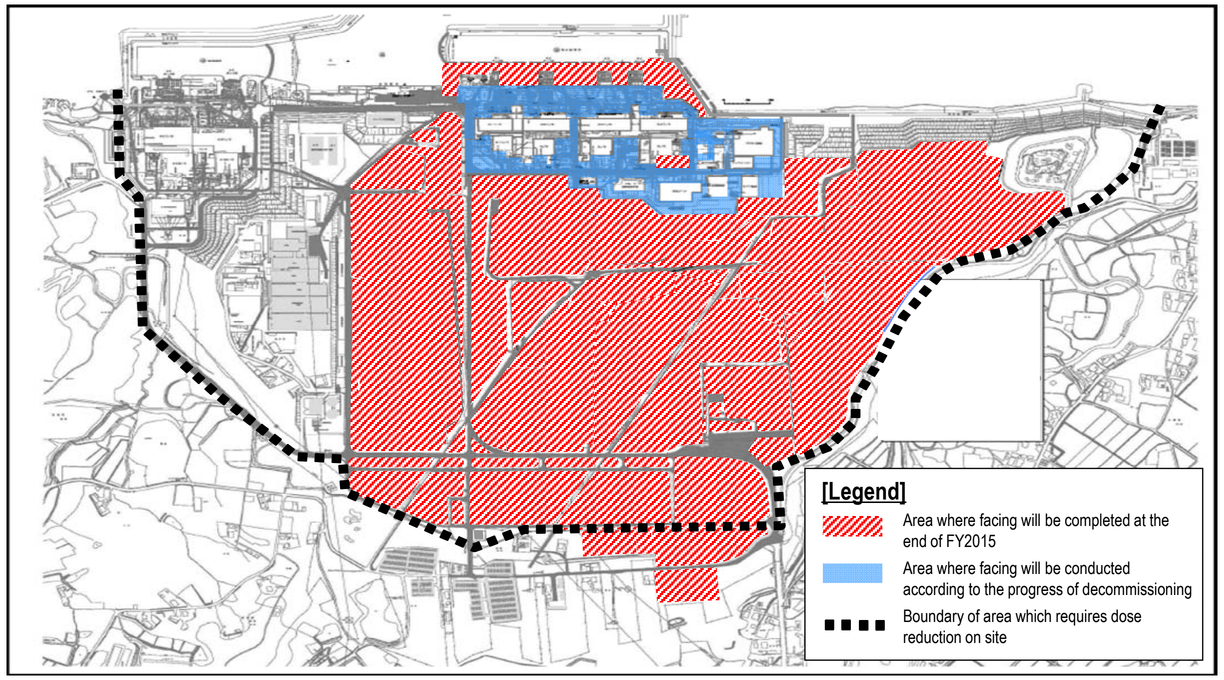


Figure 9: Facing plan

4. Plan to remove fuel 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 3

- On May 9, failure in a zoom function was confirmed in two monitoring cameras of the crawler crane used to remove rubble. One of the two cameras was replaced (May 13) and the other will be repaired during the annual inspection of the crawler crane, which will be conducted ahead of schedule.
- Removing the fuel-handling machine will require a sensitive maneuver using images delivered from the cameras. The removal will commence after mid-July, after the other camera is replaced and preparation completed.

➢ Main work to help remove spent fuel at Unit 1

- On May 15, dismantling of the Reactor Building cover commenced. Before starting the dismantling work, anti-scattering agent was sprayed through the penetration of the roof panels from May 15-20. Throughout this work, there was no significant change in dust concentration of dust monitors and monitoring posts, etc.
- On May 21, disconnect was found with the balloon installed on the reactor building 3rd floor equipment hatch to reduce the release of radioactive materials. Countermeasures will be taken before removing the roof panels.
- The removal of the building cover is being conducted with anti-scattering measures steadily implemented and safety prioritized above all.

5. Fuel debris removal plan

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)

➢ Development of technology to detect fuel debris inside the reactor

- To gain an insight into the positions and amounts of fuel debris, as required to examine fuel debris removal methods, there are plans to measure the position of debris via imaging technology using muons (a type of elementary particle), derived from cosmic radiation. Measurement equipment was installed in the area northwest outside the Unit 1 Reactor Building (February 9-10) and measurement has been underway since February 12. The data collected during the 26 days up to March 10 showed the absence of any large fuel block at the core location. The measurement continued until May 19. The accumulated data following measurement for approx. three months reduced statistical error and quantitatively confirmed the absence of large fuel blocks at the core location.

- To enhance the accuracy of the tertiary evaluation, the measurement equipment was moved and additional measurement was implemented from May 25.

➢ Preparation for investigation inside the Unit 2 PCV

- As preparation to investigate the status of the platform inside the Unit 2 PCV pedestal scheduled for August, shielding blocks installed in front of the PCV penetration (X-6 penetration), from which the investigation device will be inserted, will be removed through remote operation from June.

6. Plan to store, process and dispose of solid waste and decommission 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 April, the total storage volume of concrete and metal rubble was approx. 151,100 m³ (+2,400 m³ compared to at the end of March, with an area-occupation rate of 60%). The total storage volume of trimmed trees was approx. 78,600 m³ (-1,900 m³ compared to at the end of March, with an area-occupation rate of 57%). The increase in rubble was mainly attributable to construction related to facing, the removal of rubble around Unit 1-4 buildings, the installation of tanks and the 9th solid waste storage. The variation in trimmed trees was mainly attributable to arranging items stored there.

➢ Management status of secondary waste from water treatment

- As of May 21, 2015 the total storage volume of waste sludge was 597 m³ (area-occupation rate: 85%) and concentrated waste fluid was 9,226 m³ (area-occupation rate: 46%). The total number of stored spent vessels and High-Integrity Containers (HICs) for multi-nuclide removal equipment was 2,456 (area-occupation rate: 41%).

➢ Damage to part of the temporary rubble storage area A1 tent

- Damage was detected in the upper sheet of the temporary rubble storage area A1 (A tent), which temporarily stored a high dose of rubble (below 30 mSv/h) under shields (February 16). Repair of the damaged portion of the upper sheet was completed (April 24). The sheets were presumably turned off following the disconnection of sheet guides having fixed the sheets to the tent frames, which, in turn, was hit by a larger gulf of wind.

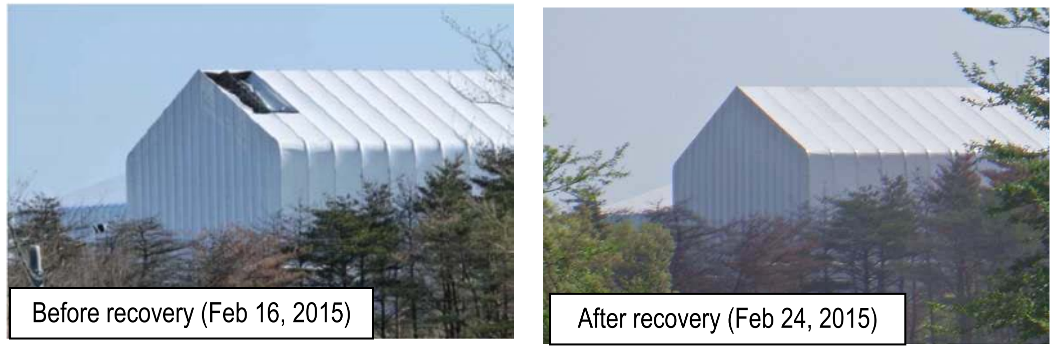


Figure 10: Recovery status of A tent

7. Plan for staffing and ensuring work safety

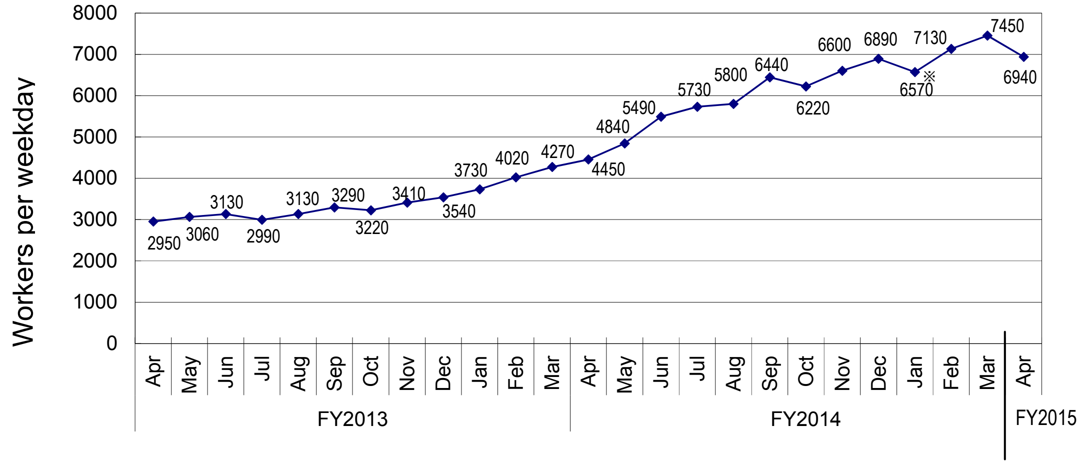
Securing appropriate staff long-term while thoroughly implementing workers' exposure dose control. Improving the work environment and labor conditions continuously based on an understanding of workers' on-site needs

➢ 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 January to March 2015 was approx. 15,100 (TEPCO and partner company workers), which exceeded the monthly average number of actual workers (approx. 11,800). Accordingly, sufficient people are registered to work on site.
- It was confirmed with prime contractors that the estimated manpower necessary for the work in June (approx. 6,810 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 11).

* Some works for which contractual procedures have yet to be completed are excluded from the June estimate.

- The number of workers has been increasing, from both within and outside Fukushima prefecture. However, as the growth rate of workers from outside exceeds that of those from within the prefecture, the local employment ratio (TEPCO and partner company workers) as of April was approx. 45%.



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

Figure 11: Changes in the average number of workers per weekday for each month since FY2013

- The average exposure dose of workers remained at approx. 1 mSv/month during both FY2013 and FY2014. (Reference: Annual average exposure dose 20mSv/year ≒ 1.7mSv/month)
- For most workers, the exposure dose was sufficiently within the limit and allowed them to continue engaging in radiation work.

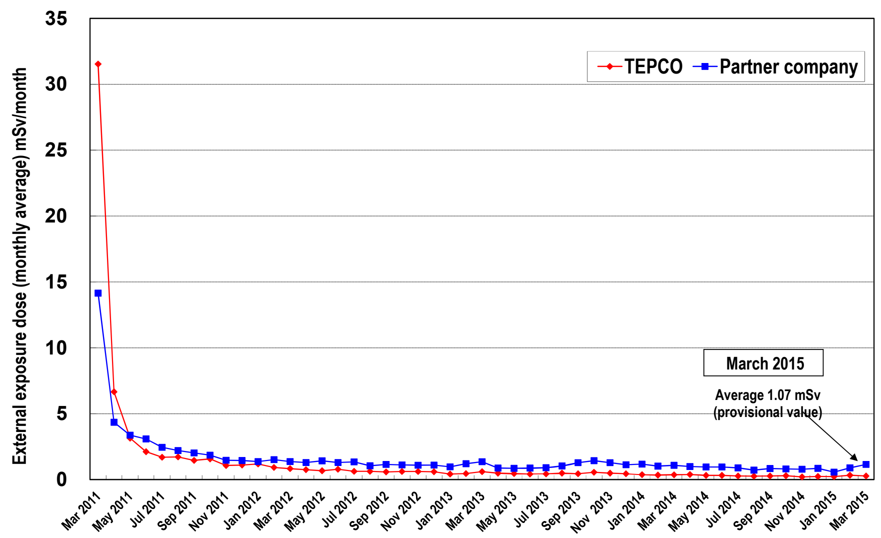


Figure 12: Changes in monthly individual worker exposure dose (monthly average exposure dose since March 2011)

➢ Measures to prevent heat stroke

- Continued from last fiscal year, measures to prevent heat stroke commenced from May to cope with the hottest season.
- Work under the blazing sun is prohibited in principle from 14:00 to 17:00 from July to September.
- Unified rules to prevent heat stroke (WBGT (*): Work at a temperature of 30°C or higher is prohibited in principle, etc.), which was introduced earlier from May this fiscal year than from August last fiscal year.

* WBGT: Index using three perspectives of humidity, radiation heat and temperature which significantly impact on the heat balance of human bodies

- Reminders are sent to encourage the wearing of cool vests.

- A workplace environment where workers are allowed to claim poorly conditions is established and early diagnosis at the emergent medical room is encouraged.
- A large rest house and mobile water supply sites (five units) are installed in response to increased number of workers on site.
- In addition to ongoing physical management using check sheets, a heat stroke manager is appointed to judge the suspension of continued work (exposure to heat) based on the results of health checkup and measurement results of heartbeat and weight before work and during intermissions.

➢ Progress status of the large rest house

- A large rest house equipped with a dining room and shop was established in the non-controlled area and operation will commence on May 31. Operation of the dining room will commence on June 1.
- A portion of the Whole Body Counter, which had been installed at J-Village, was transferred to the large rest house, which allows "regular" measurement for radiation workers (measurement for radiation workers when they are "registered" and "released" is conducted at J-Village as heretofore).
- Spaces are also installed for office work using PCs and for collective safety checks of workers such as TBM-KY (*).

* TBM-KY: Aiming to prevent accidents and disasters, potential work risks are predicted to decide on safe working methods.

Figure 13: Inner appearance of the large rest house

➢ Expansion of area where full-face masks need not be worn

- From May 29, the area where full-face masks need not be worn will be expanded to approx. 90% of the site. However, wearing full- or half-face masks is required for work exposed to highly concentrated dust; and full-face masks for works involving a risk of ingesting concentrated salt water, etc.
- After measuring the density of radioactive materials in the air and confirming that it is under the standard for wearing masks, the protective equipment will be appropriately defined to alleviate risks of heat stroke in summer, reduce workload and improve productivity.

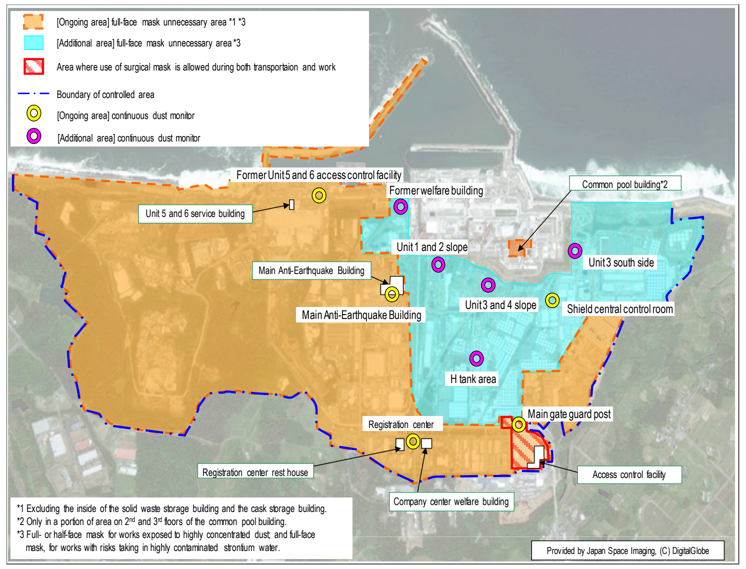


Figure 14: Area where full-face masks need not be worn

8. Others

➢ Progress toward revising the mid- to long-term roadmap

- On May 21, a meeting of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment was held to announce a draft revision plan.
- After preparing the specific target process and hearing feedback from related local parties and experts, the revision will proceed as early as possible.

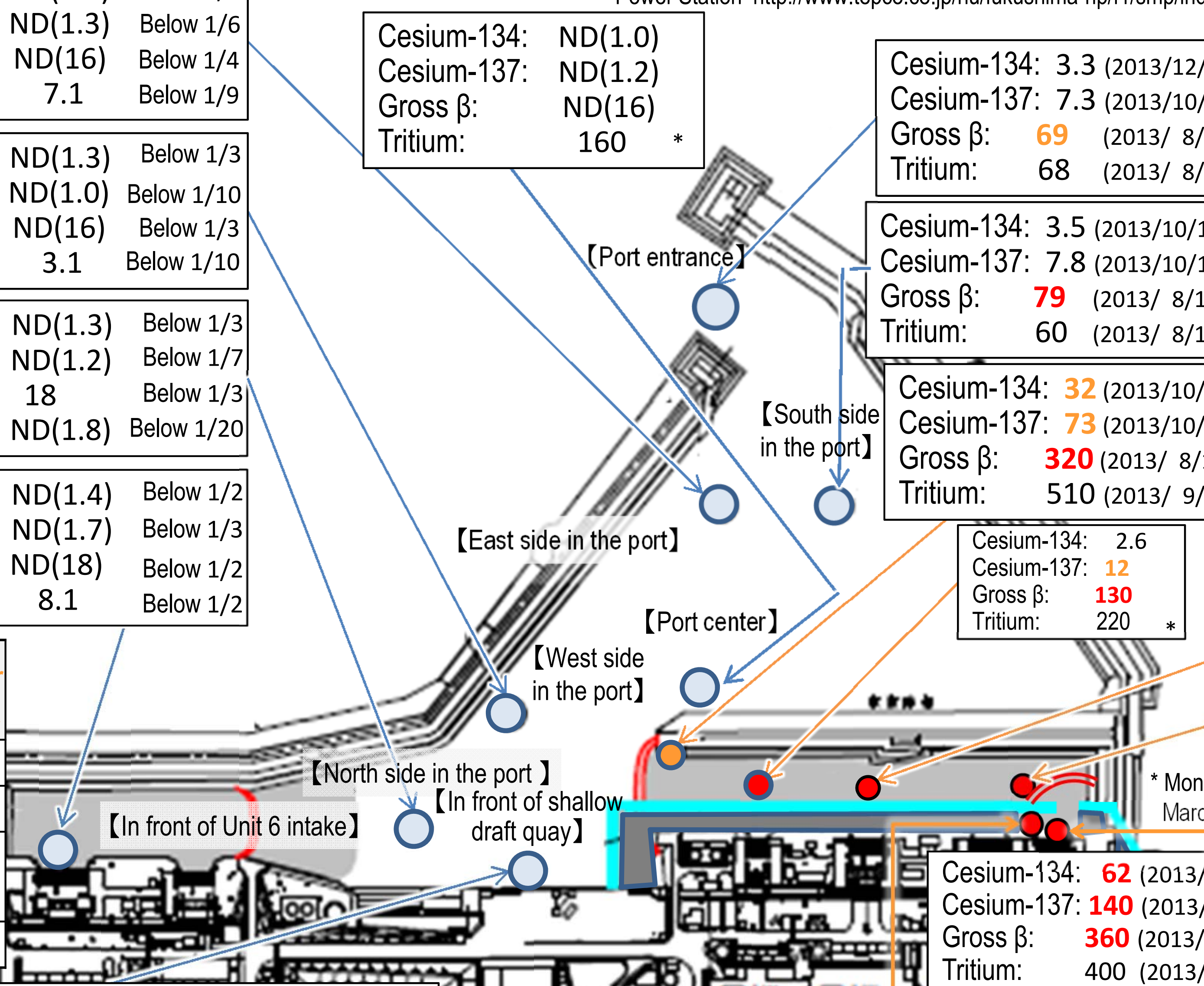
➢ Update of "Notification Standard and Announcement Method" related to troubles

- TEPCO updated the "Notification Standard and Announcement Method" formulated to promptly deliver precise information related to troubles, etc. based on decommissioning progress and its usage performance to date. The updated standard and method came into effect from May 12. TEPCO will continue to review them as necessary.

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 18-26)"; 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



Cesium-134:	3.3	(2013/10/17) →	ND(1.2)	Below 1/2
Cesium-137:	9.0	(2013/10/17) →	ND(1.3)	Below 1/6
Gross β:	74	(2013/ 8/19) →	ND(16)	Below 1/4
Tritium:	67	(2013/ 8/19) →	7.1	Below 1/9

Cesium-134:	4.4	(2013/12/24) →	ND(1.3)	Below 1/3
Cesium-137:	10	(2013/12/24) →	ND(1.0)	Below 1/10
Gross β:	60	(2013/ 7/ 4) →	ND(16)	Below 1/3
Tritium:	59	(2013/ 8/19) →	3.1	Below 1/10

Cesium-134:	5.0	(2013/12/2) →	ND(1.3)	Below 1/3
Cesium-137:	8.4	(2013/12/2) →	ND(1.2)	Below 1/7
Gross β:	69	(2013/8/19) →	18	Below 1/3
Tritium:	52	(2013/8/19) →	ND(1.8)	Below 1/20

Cesium-134:	2.8	(2013/12/2) →	ND(1.4)	Below 1/2
Cesium-137:	5.8	(2013/12/2) →	ND(1.7)	Below 1/3
Gross β:	46	(2013/8/19) →	ND(18)	Below 1/2
Tritium:	24	(2013/8/19) →	8.1	Below 1/2

Cesium-134:	ND(1.0)	
Cesium-137:	ND(1.2)	
Gross β:	ND(16)	
Tritium:	160	*

Cesium-134:	3.3	(2013/12/24) →	ND(1.4)	Below 1/2
Cesium-137:	7.3	(2013/10/11) →	ND(0.92)	Below 1/7
Gross β:	69	(2013/ 8/19) →	ND(16)	Below 1/4
Tritium:	68	(2013/ 8/19) →	6.5	Below 1/10

Cesium-134:	3.5	(2013/10/17) →	ND(1.5)	Below 1/2
Cesium-137:	7.8	(2013/10/17) →	ND(1.1)	Below 1/7
Gross β:	79	(2013/ 8/19) →	ND(16)	Below 1/4
Tritium:	60	(2013/ 8/19) →	14	Below 1/4

Cesium-134:	32	(2013/10/11) →	ND(1.6)	Below 1/20
Cesium-137:	73	(2013/10/11) →	10	Below 1/7
Gross β:	320	(2013/ 8/12) →	110	Below 1/2
Tritium:	510	(2013/ 9/ 2) →	210	Below 1/2

Cesium-134:	2.6	
Cesium-137:	12	
Gross β:	130	
Tritium:	220	*

Cesium-134:	4.2	
Cesium-137:	21	
Gross β:	180	
Tritium:	170	*

Cesium-134:	8.3	
Cesium-137:	33	
Gross β:	410	
Tritium:	860	*

* Monitoring commenced in or after March 2014

Cesium-134:	62	(2013/ 9/16) →	14	Below 1/4
Cesium-137:	140	(2013/ 9/16) →	47	Below 1/2
Gross β:	360	(2013/ 8/12) →	560	
Tritium:	400	(2013/ 8/12) →	2,200	

	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:	5.3	(2013/8/ 5) →	ND(1.6)	Below 1/3
Cesium-137:	8.6	(2013/8/ 5) →	ND(2.2)	Below 1/3
Gross β:	40	(2013/7/ 3) →	ND(18)	Below 1/2
Tritium:	340	(2013/6/26) →	2.1	Below 1/100

Cesium-134:	28	(2013/ 9/16) →	12	Below 1/2
Cesium-137:	53	(2013/12/16) →	36	Below 7/10
Gross β:	390	(2013/ 8/12) →	540	
Tritium:	650	(2013/ 8/12) →	2,400	

Summary of TEPCO data as of May 27

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 May 18-25)

	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 (0.48)
Cesium-137: ND (2013) → ND (0.52)
Gross β: ND (2013) → ND (17)
Tritium: ND (2013) → 3.9

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

Cesium-134: ND (2013) → ND (0.76)
Cesium-137: 1.6 (2013/10/18) → ND (0.68) Below 1/2
Gross β: ND (2013) → ND (17)
Tritium: 6.4 (2013/10/18) → 2.8 Below 1/3

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

Cesium-134: ND (2013) → ND (0.70)
Cesium-137: ND (2013) → ND (0.57)
Gross β: ND (2013) → ND (17)
Tritium: ND (2013) → 5.7

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

Cesium-134: ND (2013) → ND (0.77)
Cesium-137: ND (2013) → ND (0.62)
Gross β: ND (2013) → ND (17)
Tritium: 4.7 (2013/ 8/18) → 3.7 Below 9/10

【Port entrance】

Cesium-134: 3.3 (2013/12/24) → ND (1.4) Below 1/2
Cesium-137: 7.3 (2013/10/11) → ND (0.92) Below 1/7
Gross β: 69 (2013/ 8/19) → ND (16) Below 1/4
Tritium: 68 (2013/ 8/19) → 6.5 Below 1/10

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

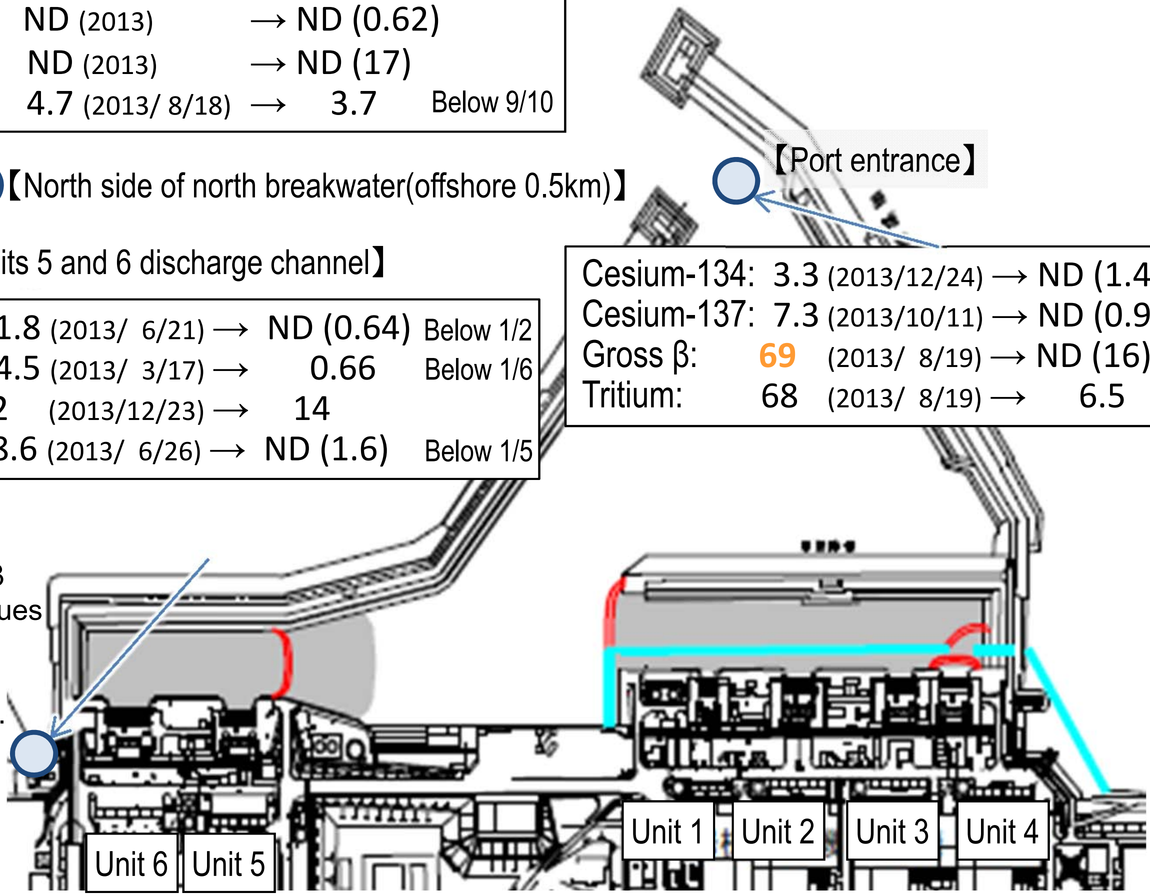
Cesium-134: ND (2013) → ND (0.80)
Cesium-137: ND (2013) → ND (0.64)
Gross β: ND (2013) → ND (15)
Tritium: ND (2013) → 2.3

【North side of Units 5 and 6 discharge channel】

Cesium-134: 1.8 (2013/ 6/21) → ND (0.64) Below 1/2
Cesium-137: 4.5 (2013/ 3/17) → 0.66 Below 1/6
Gross β: 12 (2013/12/23) → 14
Tritium: 8.6 (2013/ 6/26) → ND (1.6) Below 1/5

【Around south discharge channel】

Cesium-134: ND (2013) → ND (0.75)
Cesium-137: 3.0 (2013/ 7/15) → ND (0.68) Below 1/4
Gross β: 15 (2013/12/23) → 11
Tritium: 1.9 (2013/11/25) → ND (1.6)



Sea side impermeable wall
Silt fence

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.

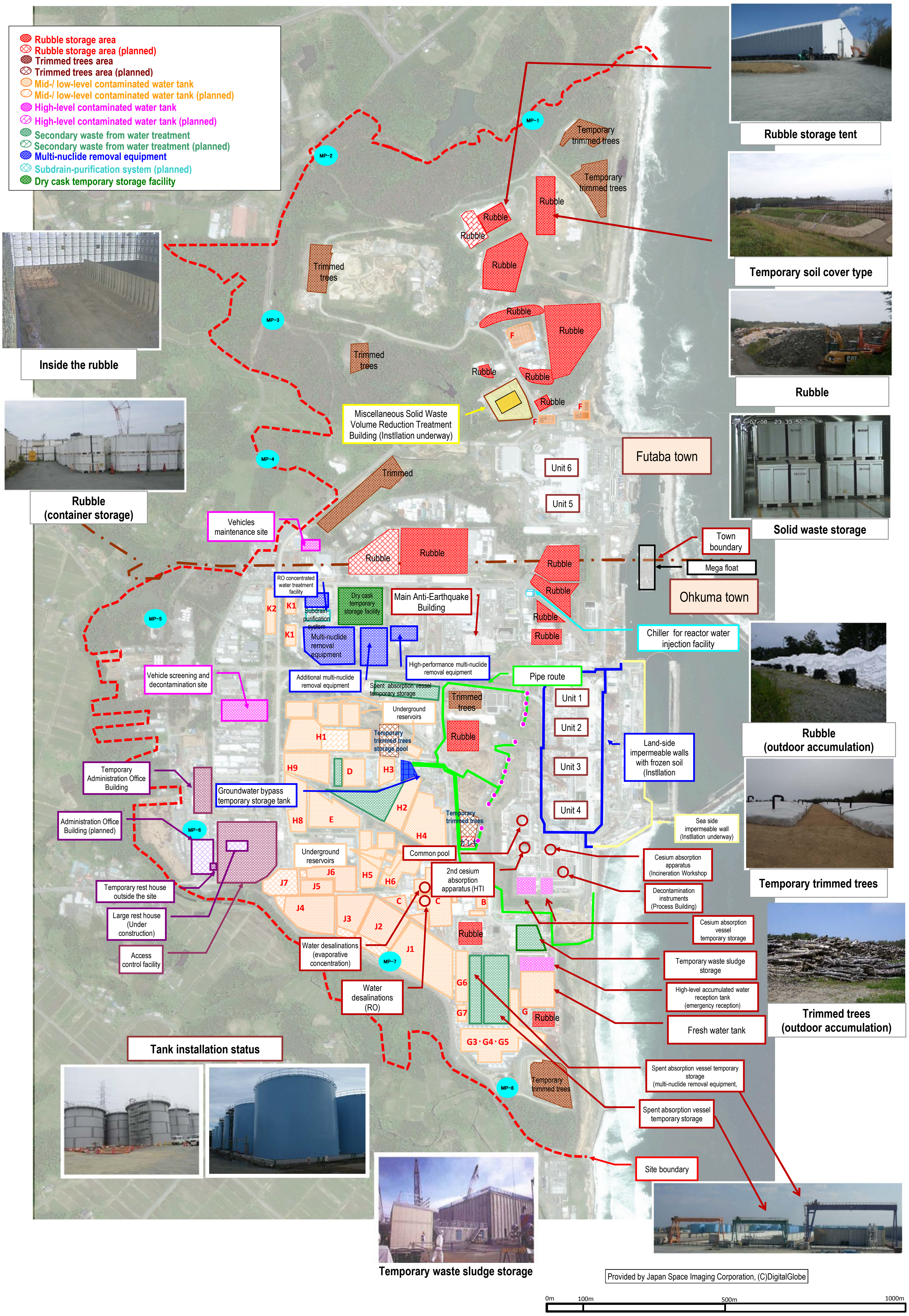
Source: TEPCO website, Analysis results on nuclides of radioactive materials around Fukushima Daiichi Nuclear Power Station, http://www.tepco.co.jp/nu/fukushima-np/f1/smp/index-j.html

Summary of TEPCO data as of May 27

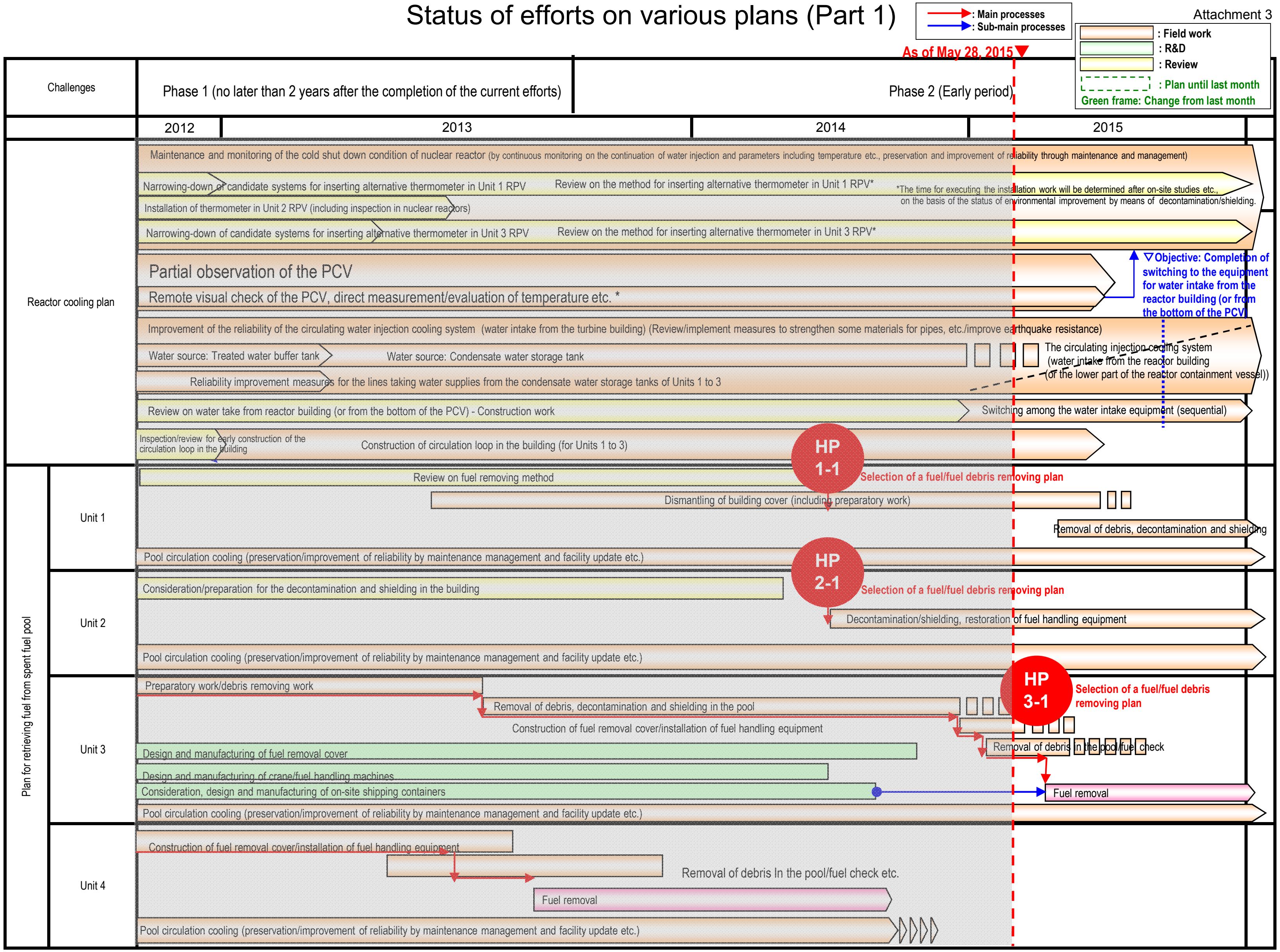
Appendix 2

May 28, 2015

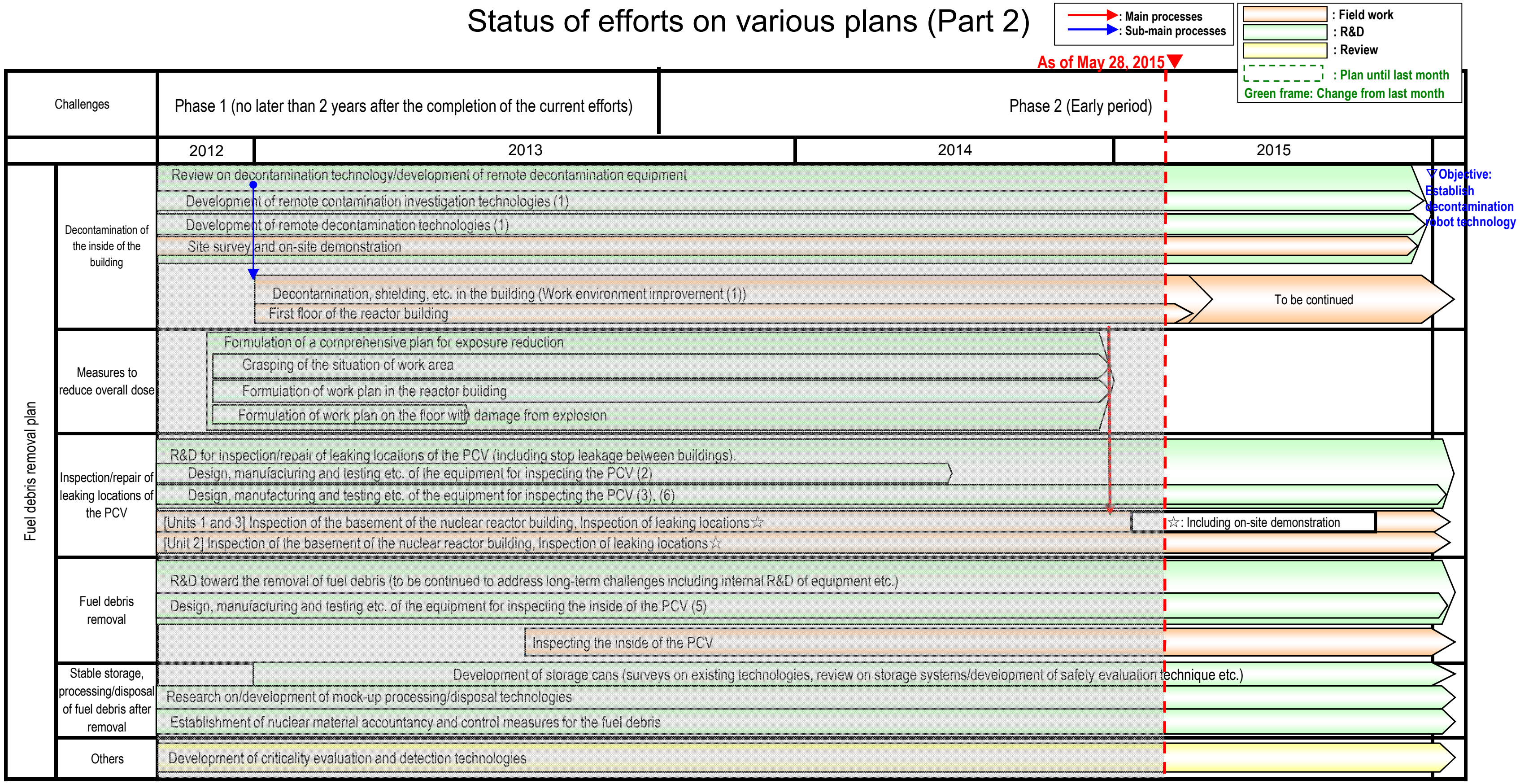
TEPCO Fukushima Daiichi Nuclear Power Station Site Layout



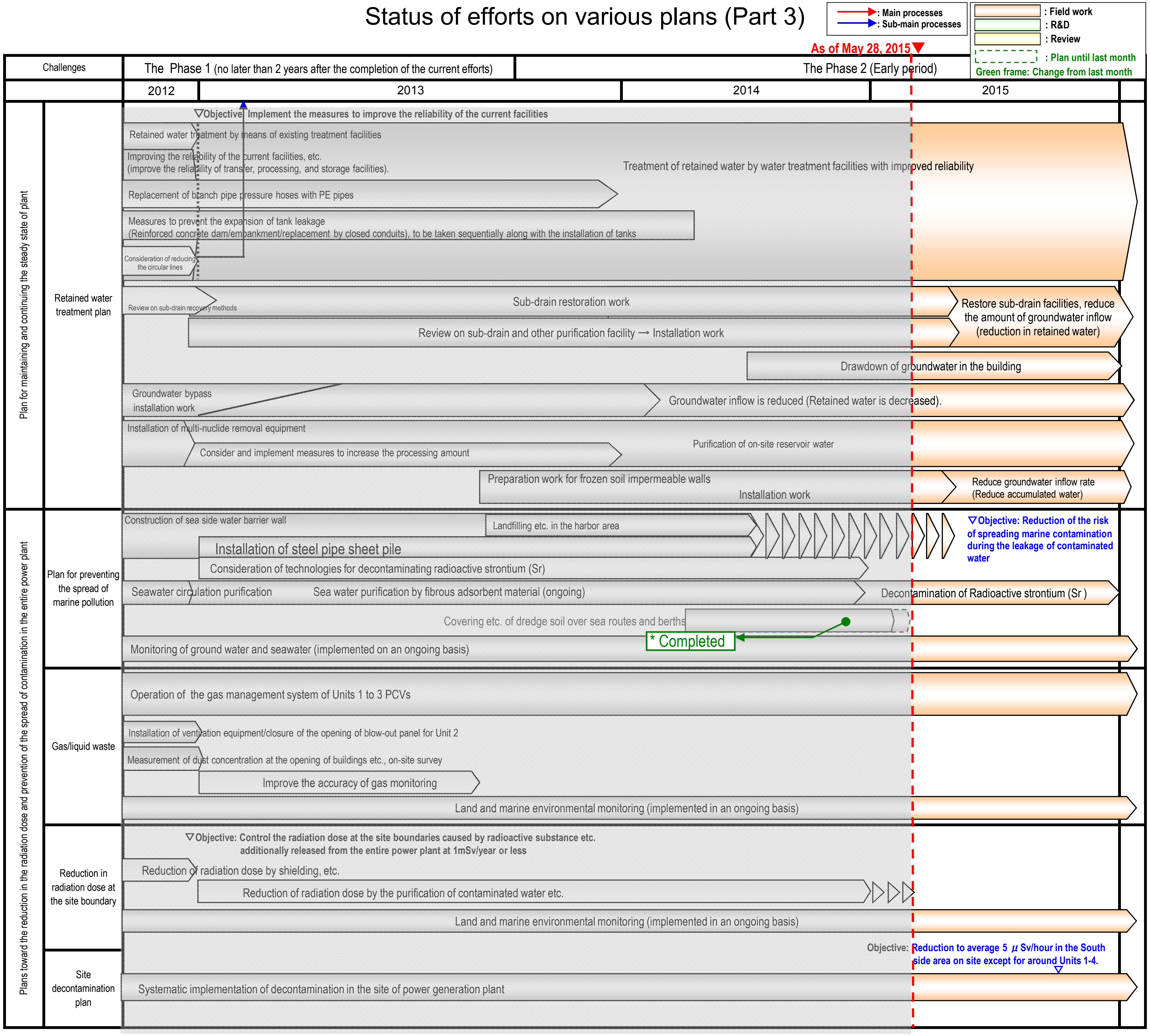
Status of efforts on various plans (Part 1)



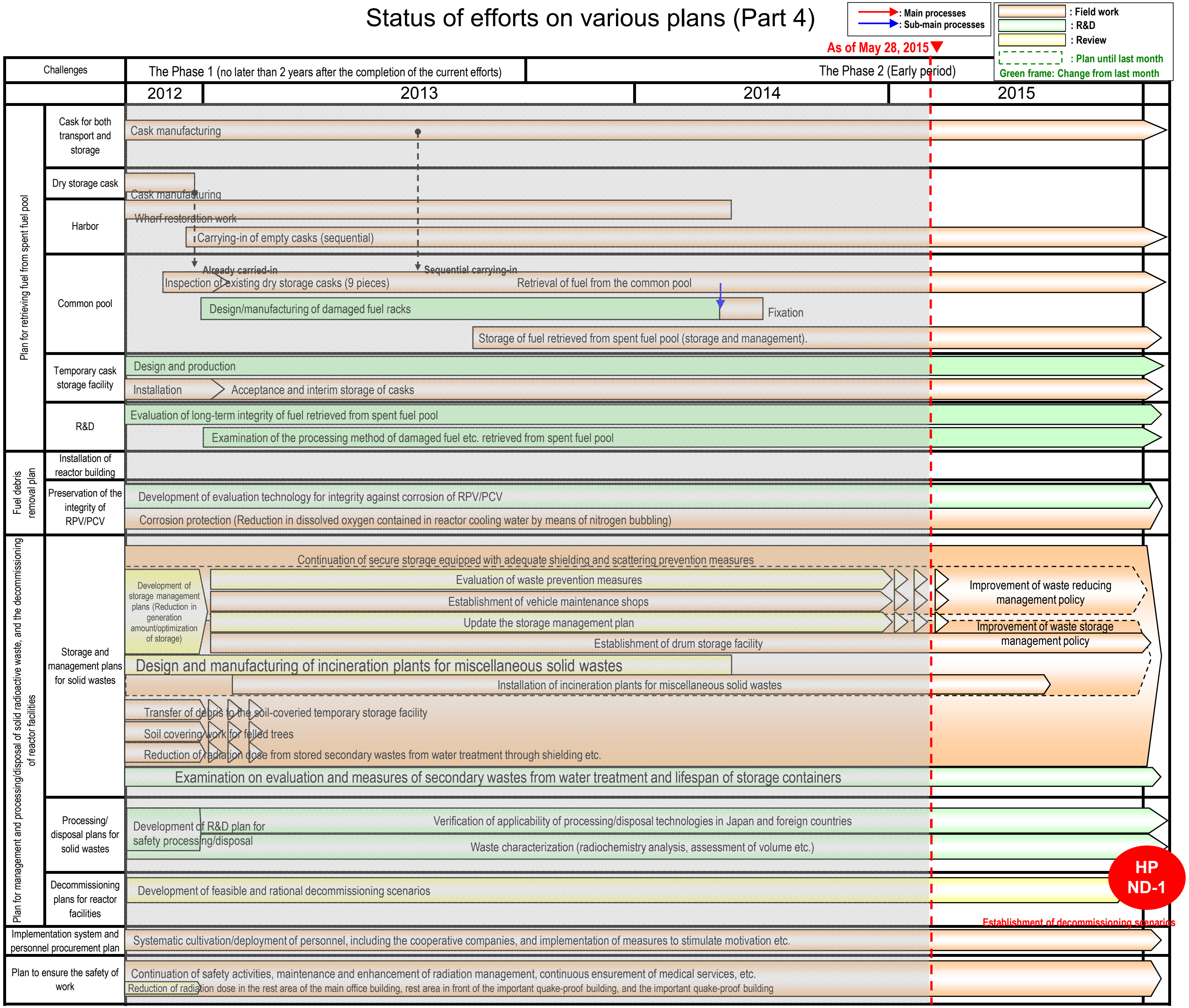
Status of efforts on various plans (Part 2)



Status of efforts on various plans (Part 3)



Status of efforts on various plans (Part 4)



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

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

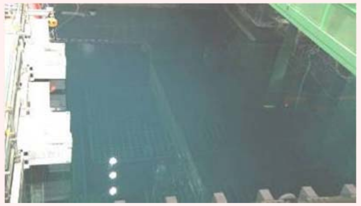
Unit 4

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.

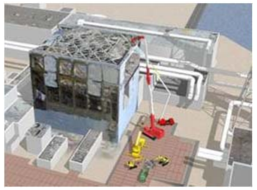
Fuel removal status



Conditions in the Unit 4 SFP

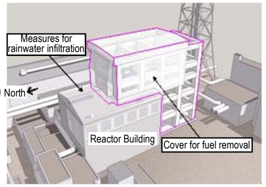
Work is proceeding with appropriate risk countermeasures, careful checks and safety first

Steps toward fuel removal



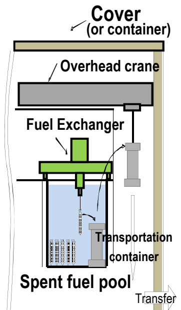
Removal of rubble from the roof of the Reactor Building

Completed in Dec. 2012



Installation of cover for fuel removal

From Apr. 2012, completed in Nov. 2013

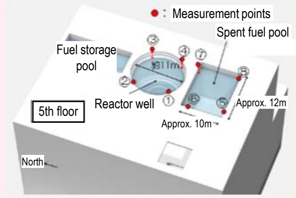


Removal

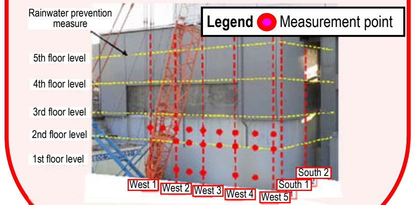
From Nov. 2013, completed in Dec. 2014

Check of the soundness of the Reactor Building

Regular inspections have been conducted, which have confirmed that the soundness of the Reactor Building has been maintained.



Check for tilt (measurement of the water level)



Check for tilt (measurement of the external wall)

* Some portions of these photos, in which classified information related to physical protection is included, were corrected.

Unit 3

To facilitate the installation of a cover for fuel removal, installation of the gantry was completed (March 13, 2013). Removal of rubble from the roof of the Reactor Building was completed (October 11, 2013). Currently, toward the installation of a cover for fuel removal and the fuel-handling machine on the operating floor (*1), measures to reduce the radiation dose (decontamination and shielding) are underway (from October 15, 2013). Removal of large rubble from the SFP is also underway (from December 17, 2013).

Before removal of the large rubble

After removal of the large rubble

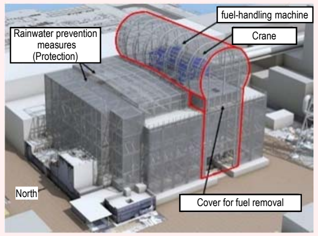


Image of the cover for fuel removal

Units 1 and 2

- Regarding Unit 1, to remove rubble from the top of the operating floor, there are plans to dismantle the cover over the Reactor Building.
  On March 16, the preparatory work for dismantling the Reactor Building cover commenced.
  From May 15, anti-scattering agent was sprayed through the penetration of the roof panels.
  Before starting the dismantling work, measures to prevent spreading will be steadily implemented.
- Regarding Unit 2, to prevent risks of reworking due to change in the fuel debris removal plan, the plan continues to be examined within a scope not affecting the scheduled commencement of removal.

Dismantling of the cover over Reactor Building Unit 1

To facilitate the early removal of fuel and fuel debris from the SFP, the cover over the Reactor Building will be dismantled to accelerate the removal of rubble on the operation floor. The radiation dose on the site boundaries will also increase compared to before the dismantling. However, through measures to reduce the release, the estimated impact of the release from Units 1 to 3 on the site boundaries (0.03mSv/year) will be limited.

①Spraying anti-scattering agents

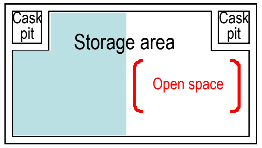
②Removing dust and dirt by suctioning devices

③Preventing dust from being stirred up via a windbreak sheet

④ Enhancing the dust-monitoring system by installing additional monitors

Measures to reduce release

Common pool

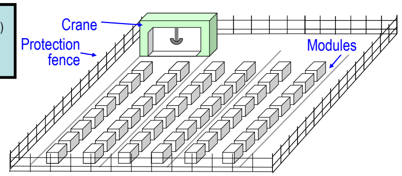


An open space will be maintained in the common pool (Transfer to the temporary dry cask storage facility)

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

3D laser scan inside the Unit 1 R/B underground floor

The upper part of the underground floor (torus room) of Unit 1 R/B was investigated with a laser scan using a remote-controlled robot, and collected 3D data.

3D data, which allows examination based on actual measurements, can be used to examine more detailed accessibility and allocation of equipment.

Combining it with 3D data on the R/B 1st floor allows obstacles on both 1st and underground floors to be checked simultaneously. This allows efficient examination of positions to install repair equipment for PCVs and vacuum break lines.

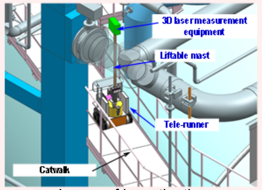
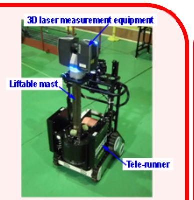


Image of investigation



External appearance of remote-controlled robot

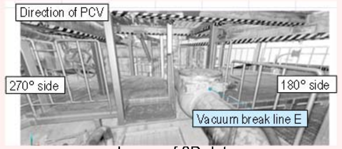


Image of 3D data

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

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

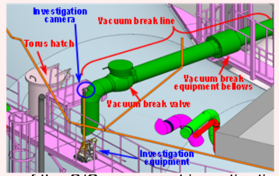
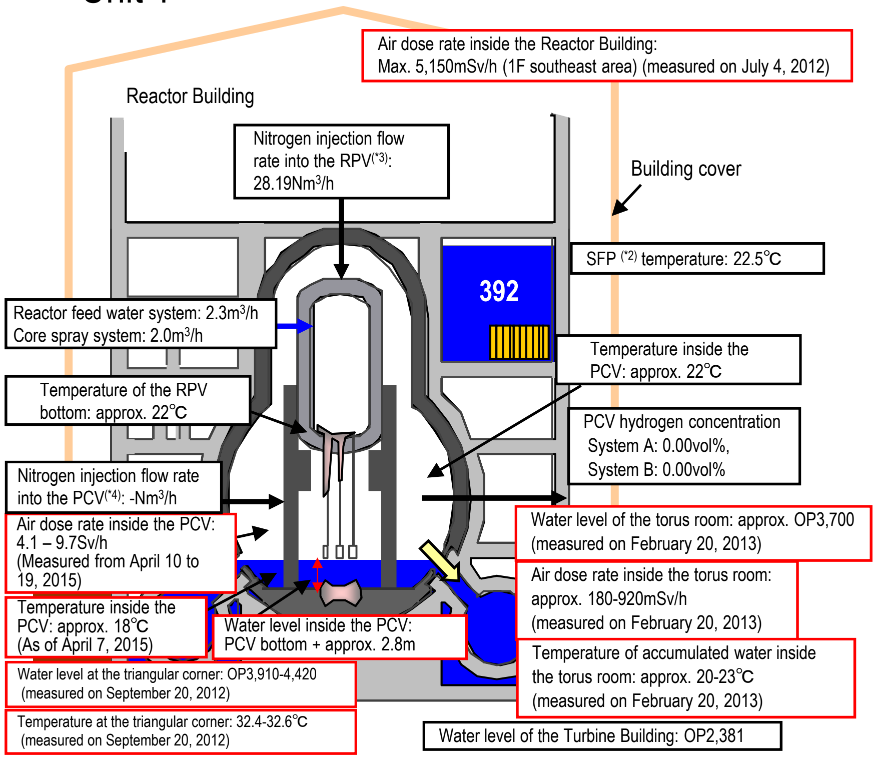


Image of the S/C upper part investigation

Unit 1



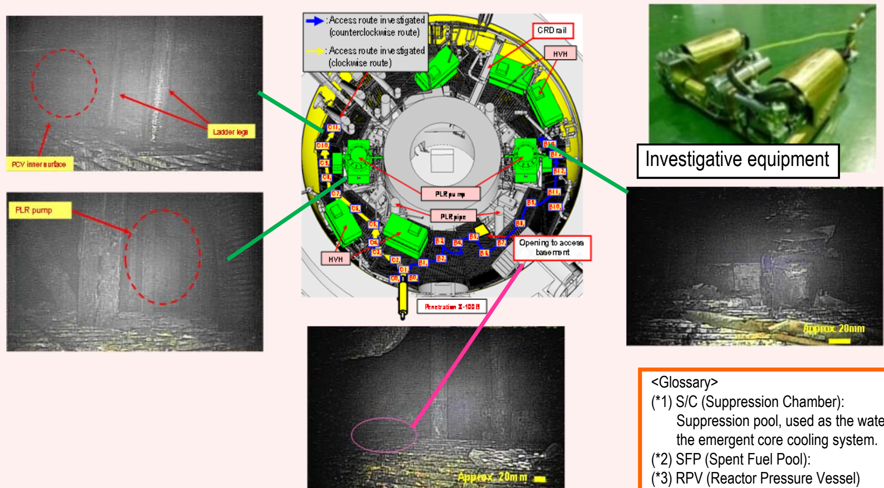
* Indices related to the plant are values as of 11:00, May 27, 2015

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: φ100mm) and stably move on the grating, a field demonstration was implemented from April 10 to 20, 2015.
- Through this investigation, information including images inside the PCV 1st floor and airborne radiation was obtained. The investigation also confirmed the absence of obstacles around the access aperture leading to the basement floor, which will be used in the next investigation. These results will be considered in next investigation of the PCV basement floor.



Investigative equipment

Investigation inside PCV

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

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

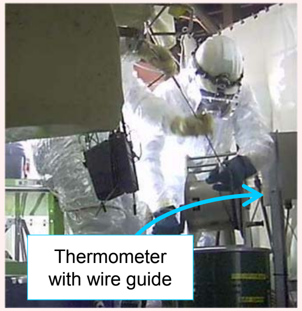
Installation of an RPV thermometer and permanent PCV supervisory instrumentation

(1) Replacement of the RPV thermometer

- As the thermometer installed at the Unit 2 RPV bottom after the earthquake had broken, it was excluded from the monitoring thermometers (February 19, 2014).
- On April 17, 2014, removal of the broken thermometer failed and was suspended. Rust-stripping chemicals were injected and the broken thermometer was removed on January 19, 2015. A new thermometer was reinstalled on March 13, 2015. The thermometer has been used as a part of permanent supervisory instrumentation since April 23.

(2) Reinstallation of the PCV thermometer and water-level gauge

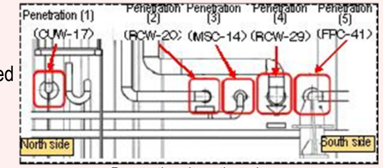
- Some of the permanent supervisory instrumentation for PCV could not be installed in the planned locations due to interference with existing grating (August 13, 2013).
- The instrumentation was removed on May 27, 2014 and new instruments were reinstalled on June 5 and 6, 2014. The trend of added instrumentation 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.



Removal situation of broken thermometer inside Unit 2 RPV

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)



Penetrations investigated

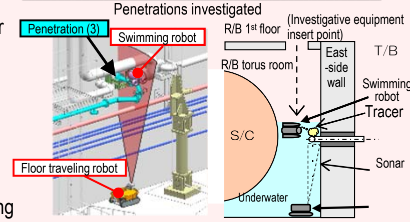
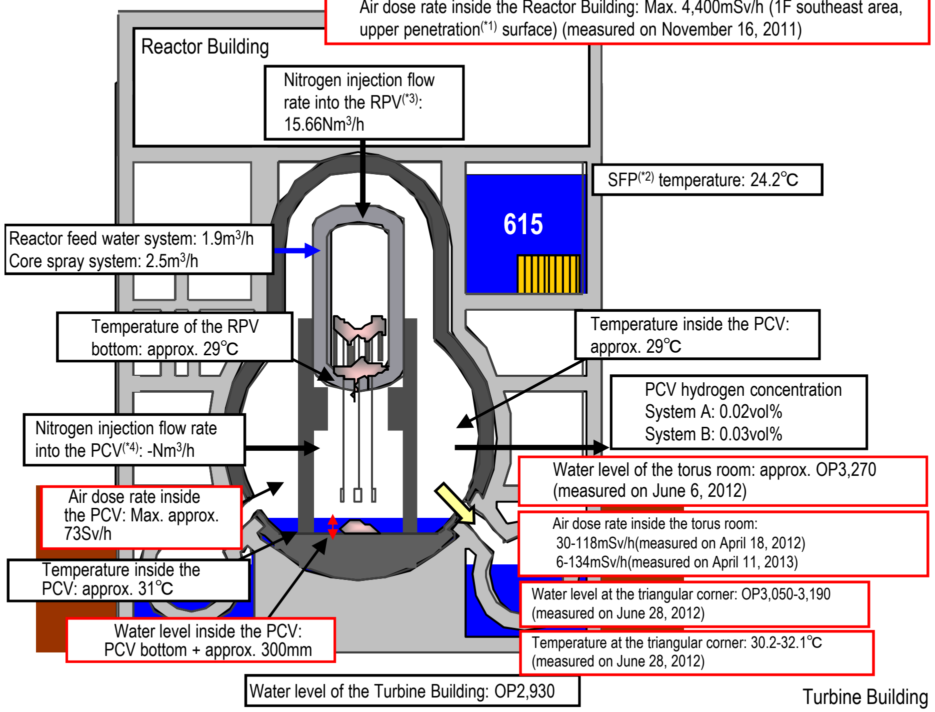


Image of the torus room east-side cross-sectional investigation

Unit 2



* Indices related to plant are values as of 11:00, May 27, 2015

Status of equipment development toward investigating inside the PCV

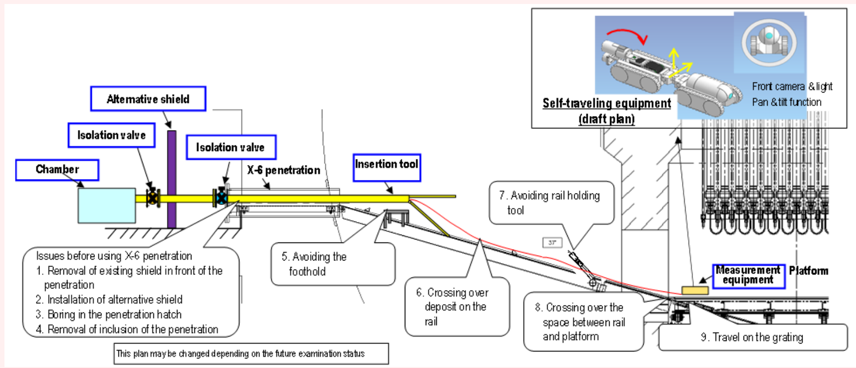
Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigations inside the PCV are scheduled.

[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. A demonstration is scheduled in the field in the 1st half of FY2015.



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

May 28, 2015
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

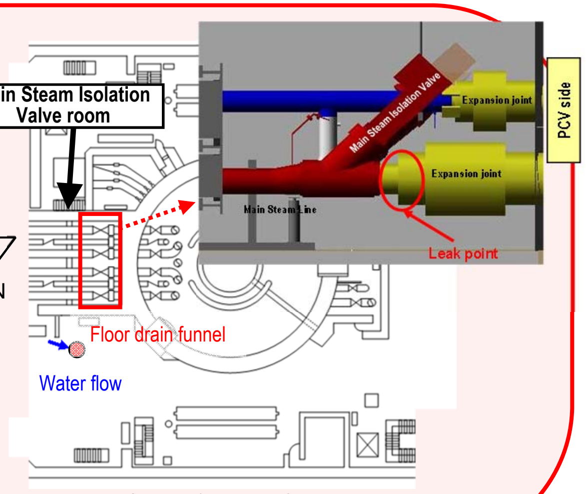
Immediate target	Identify the plant status and commence R&D and decontamination toward fuel debris removal

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 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.



Outline of the water-flow status

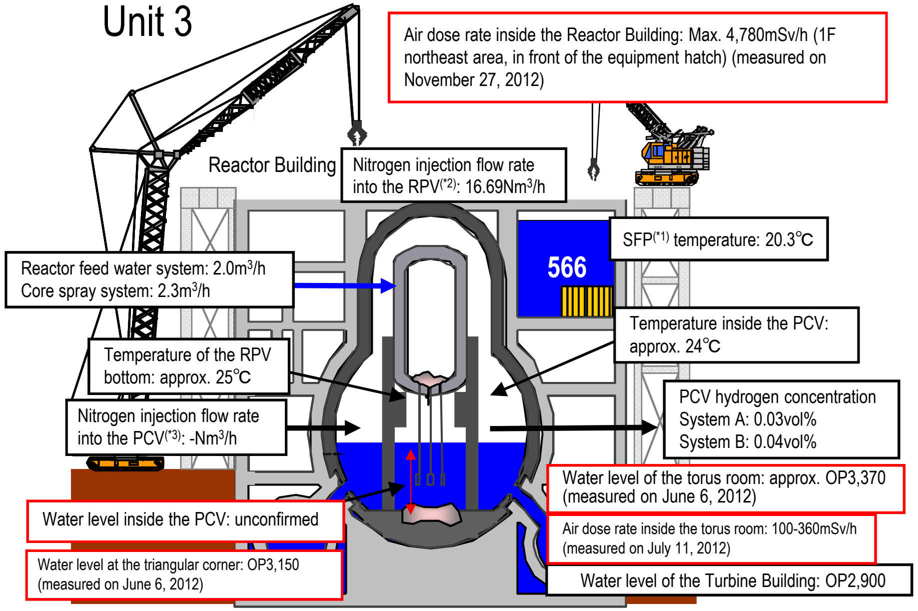
* Main Steam Isolation Valve: A valve to shut off the steam generated from the Reactor in an emergency

Decontamination inside R/B

- The contamination status inside the Reactor Building (R/B) was investigated by a robot (June 11-15, 2012).
- To select an optimal decontamination method, decontamination samples were collected (June 29 to July 3, 2012).
- To facilitate decontamination inside the Reactor Building, removal of obstacles on the 1st floor was conducted (from November 18, 2013 to March 20, 2014).

Robot for investigating the contamination status (gamma camera mounted)

Unit 3



* Indices related to plant are values as of 11:00, May 27, 2015

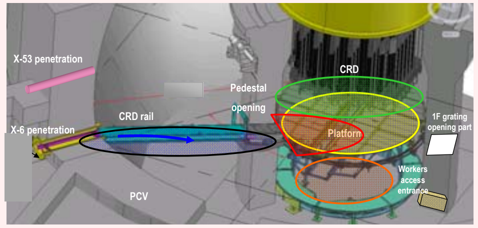
Status of equipment development toward investigating inside the PCV

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. As the water level inside the PCV is high and the penetration scheduled for use in Units 1 and 2 may be under the water, another method needs to be examined.

[Steps for investigation and equipment development]

(1) 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.
- An investigation of the inside of the PCV is scheduled for around the 1st half of FY2015. Given the high radioactivity around X-53 penetration, the introduction of remote-controlled equipment will be examined based on the decontamination status and shielding.

(2) Investigation plan following the investigation of X-53 penetration
- Based on the measurement values of hydraulic head pressure inside the PCV, X-6 penetration may decline. It is estimated that access to X-6 penetration is difficult.
- For access from another penetration, approaches such as “further downsizing the equipment” or “moving in water to access the pedestal” are necessary and will be examined.



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

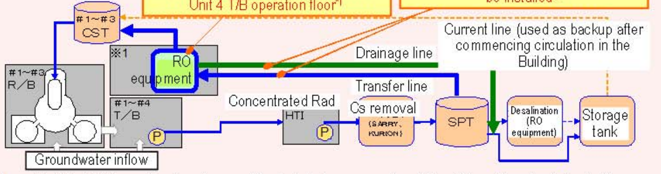
Progress toward decommissioning: Work related to circulation cooling and accumulated water treatment line

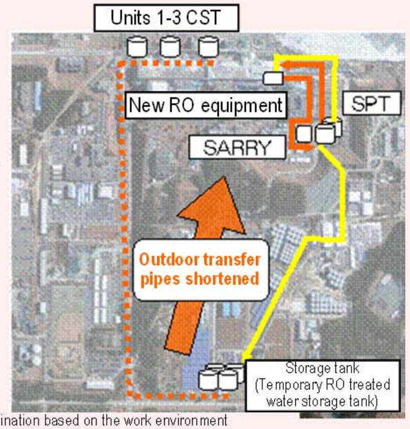
Immediate target	Stably continue reactor cooling and accumulated water treatment, and improve reliability

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 by the 1st half of 2015, 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

Typhoon measures improved for Tank Area

- Enhanced rainwater measures were implemented, including increasing the height of fences to increase the capacity to receive rainwater and installing rain gutters and fence cover to prevent rainwater inflow. Though a total of 300mm of rainfall was recorded by typhoon Nos. 18 and 19, no outflow of contaminated rainwater from inside the fences was detected.

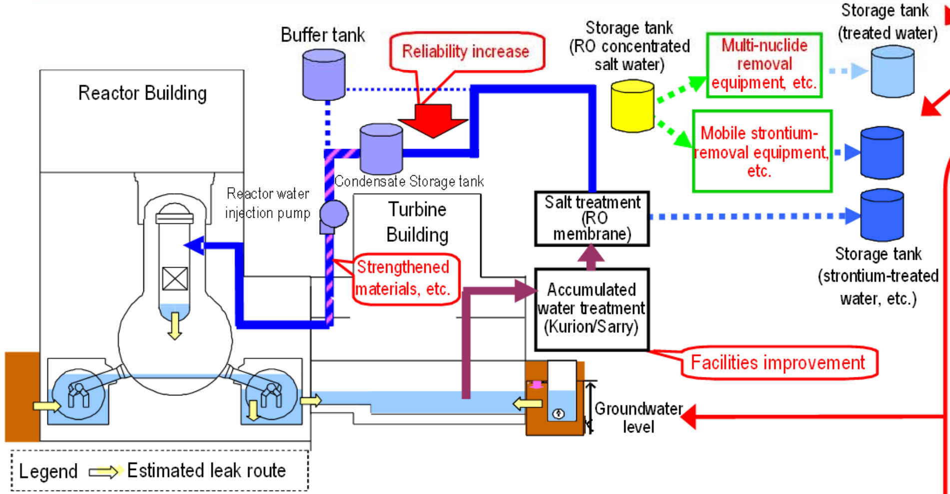

Before installing the fence cover

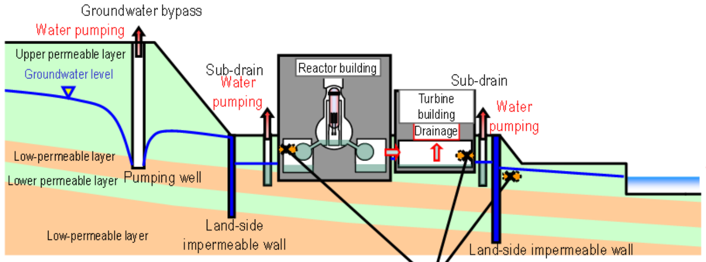

After installing the fence cover

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, with the exception of the remaining water at the tank bottom. The remaining water will be treated sequentially toward dismantling the tanks.

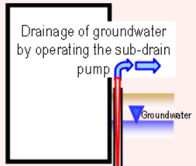
The strontium-treated water from other facilities than the multi-nuclide removal equipment will be re-purified in the multi-nuclide removal equipment to further reduce risks.





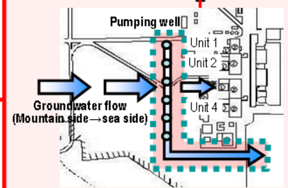
Preventing water from accessing contamination source

Preventing groundwater from flowing into the Reactor Buildings



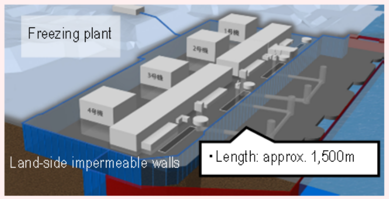
Aiming to reduce the level of groundwater by pumping subdrain water, tests were conducted to verify the stable operation of water treatment facilities, including subdrain.
The results showed that through purification by the system, the density of radioactive materials declined to below the operational target and no other γ nuclides were detected.

Reducing groundwater inflow by pumping sub-drain water



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.

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



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.
Regarding the mountain side which will commence preceding freezing, approx. 99% installation of frozen pipes has been completed.
Freezing functioning test started on April 30, 2015.

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

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

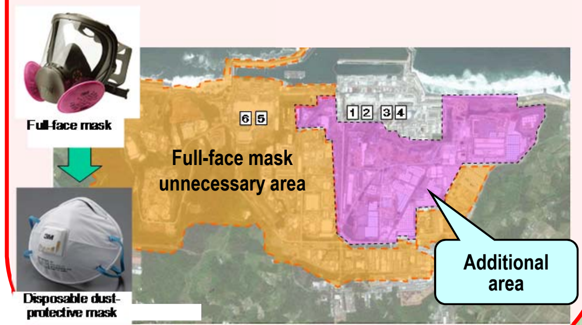
Progress toward decommissioning: Work to improve the environment within the site

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

The number of 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 will be expanded to approx. 90% of the site from May 29.

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.



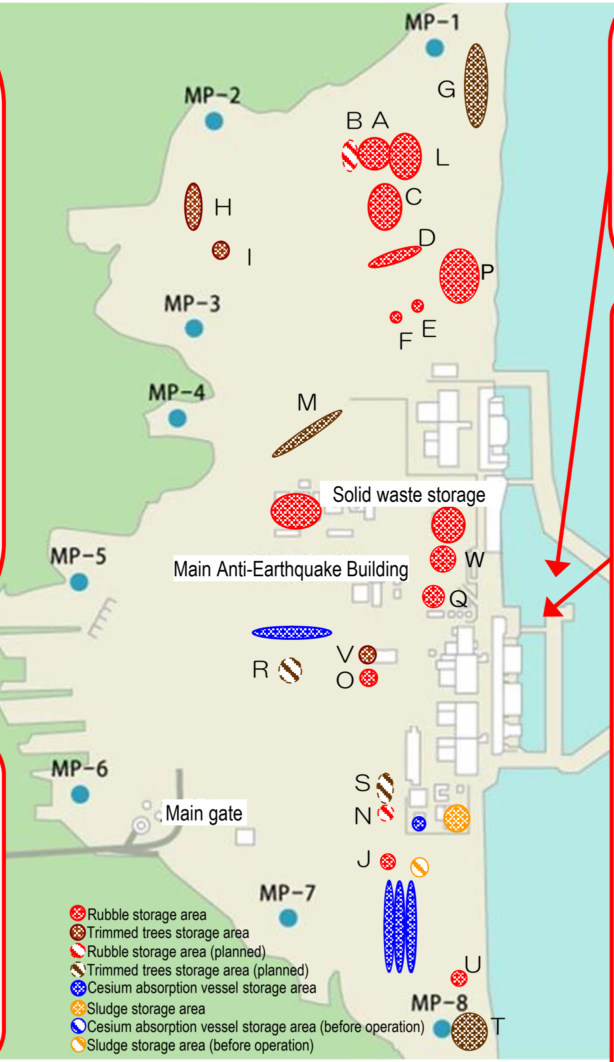
Full-face mask unnecessary area

Operation start of the large rest house

A large rest house for workers was established and its operation will commence on May 31.

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

The facility is also equipped with a dining room (operation will commence on June 1) and shop.



Installation of impermeable walls on the sea side

To prevent contamination expansion into the sea where contaminated water had leaked into groundwater, impermeable walls are being installed (scheduled for completion in September 2014).

Installation of steel pipe sheet piles temporarily completed by December 4, 2013 except for 9 pipes.

The next stage will involve installing steel pipe sheet piles outside the port, landfilling within the port, and installing a pumping facility to close before the construction completion.

Installation status of impermeable walls on the sea side
(Landfill status on the Unit 1 intake side)

Reducing radioactive materials in seawater within the harbor

- The analytical result for data such as the density and level of groundwater on the east (sea) side of the Building identified that contaminated groundwater was leaking into seawater.
- No significant change has been detected in seawater within the harbor for the past month, nor was any significant change detected in offshore measurement results as of last month.
- To prevent contamination expansion into the sea, the following measures are being implemented:

(1) Prevent leakage of contaminated water

- Ground improvement behind the bank to prevent the expansion of radioactive materials.
  (Between Units 1 and 2: completed on August 9, 2013;
  between Units 2 and 3: from August 29 and completed on December 12, 2013;
  between Units 3 and 4: from August 23, 2013 and completed on January 23, 2014)
- Pumping groundwater in contaminated areas (from August 9, 2013, scheduled to commence sequentially)

(2) Isolate water from contamination

- Enclosure by ground improvement on the mountain side
  (Between Units 1 and 2: from August 13, 2013 and completed on March 25, 2014;
  between Units 2 and 3: from October 1, 2013 and completed on February 6, 2014;
  between Units 3 and 4: from October 19, 2013 and completed on March 5, 2014)
- To prevent the ingress of rainwater, the ground surface was paved with concrete (commenced on November 25, 2013 and completed on May 2, 2014)

(3) Eliminate contamination sources

- Removing contaminated water in branch trenches and closing them (completed on September 19, 2013)
- Treatment and removal of contaminated water in the seawater pipe trench

Unit 2: November 25 to December 18, 2014 - tunnel sections were filled.
February 24, 2015 - filling of the Vertical Shafts commenced.
Unit 3: February 5 to April 8, 2015 - tunnel sections were filled.
May 2, 2015 – filling of Vertical Shafts commenced
Unit 4: February 14 – March 21, 2015 - tunnel sections were filled.
April 15 to 28, 2015 - opening apertures II and III were filled.

Overview of measures