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.

Three principles behind contaminated water countermeasures

Countermeasures for contaminated water (Note 2) are implemented in accordance with the following three principles:

1. **Eliminate** contamination sources
   - Multi-nuclide removal equipment, etc.
   - Remove contaminated water in the trench (Note 3)
   - Land-side impermeable walls
   - Sea-side impermeable walls
   - Waterproof pavement

2. **Isolate** water from contamination
   - Pump up ground water for bypassing
   - Pump up ground water near buildings
   - Land-side impermeable walls
   - Waterproof pavement

3. **Prevent leakage** of contaminated water
   - Soil improvement by sodium silicate
   - Sea-side impermeable walls
   - Increase tanks (welded-joint tanks)

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

(Note 2) The amount is decreasing due to measures such as groundwater bypass and water-stoppage of the buildings.

(Note 3) Underground tunnel containing pipes.
Strontium removal operation by cesium absorption apparatuses (KURION/SARRY) commenced

The cesium absorption apparatus (KURION) and the secondary cesium absorption apparatus (SARRY) that remove cesium from contaminated water transferred from buildings were modified to make them capable of removing strontium and operation in work that commenced on December 26.

As it was confirmed that the strontium removal capability achieved the target, no additional RO concentrated salt water (contaminated water, which requires strontium treatment, stored in tanks) has been generated since January 19.

Operation of RO concentrated water treatment equipment commenced

In addition to the multi-nuclide removal equipment (ALPS), multiple types of strontium removal equipment have been installed to progress with the treatment of contaminated water in tanks.

New RO concentrated water treatment equipment was installed and the treatment of contaminated water commenced on January 10.

Multiple measures will continue, aiming to reduce the risks of contaminated water.

Outlook of contaminated water treatment

Regarding contaminated water treatment by multi-nuclide removal equipment (ALPS), it is estimated that treatment of the all the contaminated water would be difficult within this fiscal year at the current rate, and the work was postponed to May.

The specific completion time will be announced by mid-March.

Fukushima Advisory Board on Decommissioning and Contaminated Water Management was held

On January 7, the 6th meeting (Fukushima City) was held to introduce the concept on the revision of the Mid-and-Long-Term Roadmap and received feedback from local municipal chief.

The roadmap will be revised based on these opinions.

Fatal accident involving worker falling from roof of tank

On January 19, an accident while a tank for receiving rainwater was being installed, where a worker who was preparing for investigation inside the tank fell from the tank roof (height: approx. 10m) and passed away the next day.

From January 21, all works onsite were suspended to conduct a safety inspection.

A detailed investigation will be conducted to clarify the cause of this incident as well as striving to prevent recurrence.
Major initiatives – Locations on site

- Filling of Unit 3 seawater-pipe trench tunnel sections by the grout will commence.
- Removal of broken thermometer inside Unit 2 reactor completed for replacing.
- Investigation on fuel debris inside Unit 1 reactor will commence.
- Fatal accident involving worker falling from roof of tank.
- Operation of RO concentrated water treatment equipment commenced.
- Strontium removal operation by cesium absorption apparatuses commenced.
- Outlook of contaminated water treatment.

Fukushima Advisory Board on Decommissioning and Contaminated Water Management was held.

- Data of Monitoring Posts (MPs) measuring airborne radiation rate around site boundaries show 1.053 - 3.963 μSv/h (December 24, 2014 – January 27, 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 the 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 to July 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 reactor

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. 10 to 40°C for the past month, though they vary depending on the unit and location of the thermometer.

2. Release of radioactive materials from the Reactor Buildings

The density of radioactive materials newly released from Reactor Building Units 1-4 in the air measured at site boundaries was evaluated at approx. 1.4 x 10^9 Bq/cm² for both Cs-134 and -137. The radiation exposure dose due to the release of radioactive materials was 0.03 mSv/year (equivalent to approx. 1/70 of the annual radiation dose by natural radiation (annual average in Japan: approx. 2.1 mSv/year)) at the site boundaries.

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

(Reference)

- The density limit of radioactive materials in the air outside the surrounding monitoring area
  - [Cs-134]: 2 x 10^7 Bq/cm²
  - [Cs-137]: 3 x 10^7 Bq/cm²
- 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/cm²)
  - [Cs-137]: ND (Detection limit: approx. 2 x 10^7 Bq/cm²)

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.

Replacement of the thermometer at the bottom of Unit 2 RPV
- In April, attempts to remove and replace the thermometer installed at the bottom of the RPV, which had broken in February 2014, failed and the operation was suspended. The estimated cause was fixing or added friction due to rust having formed.
- Full-scale piping was used to confirm the potential for wire guides to be drawn out, contingent on the use of rust-stripping chemicals that do not generate hydrogen (December 5, 2014). Rust-stripping chemicals were injected from January 14 and the broken thermometer was removed on January 19. In the next steps, a method to install a new thermometer will be examined, the workers involved will be trained and the new thermometer will be reinstalled within this fiscal year.

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 January 28, 73,806 m³ 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 100 m³/day based on the evaluation data to date through measures such as the 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. 10-15cm compared to the level before pumping at the groundwater bypass started.
- Due to a decrease in the flow rate of pumping well Nos. 10 and 12, water pumping was stopped for cleaning (No. 10: from January 13, No. 12: from December 12, 2014 to January 6, 2015).

3. Other measures

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). As of January 28, drilling at 1,144 points (for frozen pipes: 940 of 1,549 points, for temperature-measurement pipes: 204 of 321 points) and installation of frozen pipes at 594 of 1,549 points had been completed (see Figure 2).
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). To date, approx. 196,000 m³ at the existing, approx. 64,000 m³ at the additional and approx. 18,000 m³ at the high-performance multi-nuclide removal equipment have been treated (as of January 22, including approx. 9,500m³ stored in J(D) tank, which contained water with a high density of radioactive materials at the System B outlet).

Toward reducing the risk of contaminated water stored in tanks
- Operation at RO concentrated water treatment equipment that removes strontium from RO concentrated salt water commenced (January 10). As of January 22, approx. 8,000 m³ had been treated.
- To purify the RO concentrated salt water stored in tanks, mobile strontium-removal equipment is being operated in the G4 south area (G4 south area: from October 2, 2014). As of January 22, approx. 4,000 m³ of contaminated water had been treated. As of January 22, approx. 4,000 m³ of contaminated water is being treated.
- Treatment measures comprising the removal of strontium by cesium absorption apparatus (KURION) and secondary cesium absorption apparatus (SARRY) commenced (from January 6, 2015 and December 26, 2014). The decreased strontium concentration in treated water was confirmed (January 19), whereupon stored water in tanks after treatment was handled as strontium treated water. No additional RO concentrated salt water was generated. As of January 22, approx. 1,000 m³ has been treated.

Outlook of contaminated water treatment
- Regarding the treatment of contaminated water by multi-nuclide removal equipment, it is considered difficult to treat the entire volume of contaminated water within this fiscal year at the current rate and the work was postponed to May.
- The specific completion time will be announced by mid-March.

Measures in Tank Areas
- Rainwater under the temporary release standard having accumulated inside the fences in the contaminated water tank area, was sprinkled on site after removing radioactive materials using rainwater-treatment equipment since May 21, 2014 (as of January 26, a total of 13,820 m³).

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

Figure 3: Whole image of water treatment facilities

Figure 4: Status of accumulated water storage
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. Water was pumped up from the Vertical Shafts on December 24, 2014 and January 20, 2015 and the filling status of the tunnel sections was confirmed. Filling of the Vertical Shafts will proceed after confirming the placement status.
- Regarding the Unit 3 seawater-pipe trench, filling of the tunnel sections will commence.
- Regarding the Unit 4 seawater-pipe trench, inside filling will be done after disconnecting the building from the trench to prevent the filler flowing into the Turbine Building side.

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 at groundwater Observation Holes Nos. 0-1 and 0-4 since July 2014 and currently stand at around 10,000 and 23,000 Bq/L respectively in these locations. 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 density of gross β radioactive materials at groundwater Observation Hole No. 1-6 increased to 7.8 million Bq/L in October 2014, but currently stands at around 500,000 Bq/L. Though the density of tritium at groundwater Observation Hole No. 1-8 had become around 10,000 Bq/L, it fluctuated greatly after June 2014 and is currently around 30,000 Bq/L. Though the tritium at groundwater Observation Hole No. 1-7, which had been around 10,000 Bq/L, increased to 160,000 Bq/L since October 2014, it currently stands at around 40,000 Bq/L. The density of gross β, which has been increasing since March 2014, reached 1.2 million Bq/L by October and currently stands at around 200,000 Bq/L. Water pumping from the well point (10 m³/day) and the pumping well No. 1-16 (P) (1 m³/day) installed near the Observation Hole No. 1-16 continues.
  - Regarding the radioactive materials in groundwater near the bank between the Unit 2 and 3 intakes, the densities of tritium and gross β radioactive materials have been decreasing since November 2014, currently standing at around 3,000 and 40,000 Bq/L for tritium and gross β radioactive materials respectively. To increase the height of the ground improvement area with mortar, the volume of water pumped from the well point increased to 50 m³/day (from October 31, 2014). The height increase commenced on January 8.
  - 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 as up to December 2014.
  - Regarding the radioactive materials in seawater outside the seaside 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 December 2014.
  - The density of radioactive materials in seawater within the port has been slowly declining as up to December 2014.
  - The radioactive material density in seawater at outside the port entrance has remained within the same range previously recorded.
  - Construction to cover the seabed soil within the port is underway to prevent contamination spreading due to stirred-up seabed soil (scheduled for completion at the end of FY2014). Since December 14, 2014, Area (2) is being covered. As of January 27, 44% of the construction had been completed (see Figure 9). The seabed of the intake open channels had been covered by FY2012.
  - Curtain nets with cesium and strontium absorption fibers attached were installed at the opening of the seaside impermeable walls (January 15).
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.

- Fuel removal from the Unit 4 spent fuel pool
  - To confirm the post-transportation status of two leaked fuel assemblies that were transported from the Unit 4 spent fuel pool to the common pool, visual inspections using underwater cameras and examinations of leaked fuel rods using fiberscopes were conducted (December 17-18, 2014). The results of these examinations showed that there was no potential for incidents such as dissipation of pellets due to cracks in covered pipes.

- Main work to help remove spent fuel at Unit 3
  - During rubble removal inside the spent fuel pool, the console and overhanging pedestal of a fuel-handling machine, which were scheduled for removal, fell (August 29, 2014) and the work was therefore suspended. However, on December 17, 2014, the rubble removal work resumed. As a fall prevention measure, additional cover panels were installed (from January 14-20). The next steps will involve removal of the fuel handling machine trolley 2nd floor (see figure 10).
Main work to help remove spent fuel at Unit 1
- Spraying of anti-scattering agents on the top floor of the Reactor Building and investigations into the status of rubble and concentration of dust were conducted and the roof panels of the Reactor Building cover that had been removed were replaced on December 4, 2014.
- After March, dismantling of the building cover is scheduled to progress by once again removing the roof panel.

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 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), which are derived from cosmic radiation. A detector will be installed to the northwest outside the Unit 1 Reactor Building and measurement using muon radiography is scheduled to commence.
- Decontamination of the Unit 3 Reactor Building 1st floor
  - Prior to future investigation inside the PCV, a radiation-source survey was conducted on Unit 3 Reactor Building 1st floor up to December. Since January 5, middle-place decontamination has been underway using dedicated equipment.

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 December 2014, the total storage volume of concrete and metal rubble was approx. 134,400 m³ (+2,500 m³ compared to at the end of November 2014, area-occupation rate: 56%). The total storage volume of trimmed trees was approx. 79,700 m³ (±0 m³ compared to at the end of November 2014, area-occupation rate: 58%). The increase in rubble was mainly attributable to construction to install tanks.
- Management status of secondary waste from water treatment
  - As of January 22, the total storage volume of waste sludge was 597 m³ (area-occupation rate: 85%) and concentrated waste fluid was 8,948 m³ (area-occupation rate: 45%). The total number of stored spent vessels and high-integrity containers (HICs) for multi-nuclide removal equipment was 1,621 (area-occupation rate: 49%).

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 September to November 2014 was approx. 13,900 (TEPCO and partner company workers), which exceeded the monthly average number of actual workers (approx. 11,000). 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 (approx. 6,770 per day; TEPCO and partner company workers*) would be secured at present. The average numbers of workers per day for each month of the last fiscal year (actual values) were maintained with approx. 3,000 to 6,900 per month since the last fiscal year (See Figure 11).
  * Some works for which contractual procedures have yet to be completed are excluded from the February estimate.

- The number of workers is increasing, both from 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 December was approx. 45%.

- The average exposure dose of workers remained at approx. 1mSv/month during both FY2013 and FY2014. (Reference: annual average exposure dose 20mSv/year = 1.7mSv/month)
- For most workers, the exposure dose is sufficiently within the limit and at a level which allows them to continue engaging in radiation work.

- Preventing infection and expansion of influenza and norovirus
  - Since October 2014, measures for influenza and norovirus have been implemented. As part of these efforts, free influenza vaccination (subsidized by TEPCO) is being provided at the new Administration Office Building in the Fukushima Daiichi Nuclear Power Station (from October 29 to December 5, 2014) and medical clinics around the site (from November 4, 2014 to January 30, 2015) for partner company workers. As of January 27, 2015, a total of 8,445 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
  - From the 47th week of 2014 (November 10-17, 2014) to the 4th week of 2015 (January 19-25, 2015), there were 279 cases of influenza infection and 5 cases of norovirus infection. The totals for the same period of the previous season showed 39 cases of influenza infection and 25 cases of norovirus infection. The totals for the entire previous season (December 2013 to May 2014) were 254 cases of influenza infection and 35 cases of norovirus infection.
Progress of the new Administration Office Building

- To facilitate efforts to closely collaborate with surrounding buildings, expedite operations and use the premises more effectively, the building location changed.
- The process was reviewed due to the numerous works involved in removing and transferring obstacles.
- Construction will commence in June 2015 and be completed in August 2016.

8. Others

- Fukushima Advisory Board on Decommissioning and Contaminated Water Management (6th meeting) was held
  - On January 7, the 6th meeting (Fukushima City) was held to introduce the concept of revising the Mid-and-Long-Term Roadmap and feedback from local residents was received. The roadmap will be revised based on these opinions.

- Fatal accident involving a worker falling from the roof of a rainwater receiving tank
  - On January 19, an accident occurred while a tank for receiving rainwater was being installed, whereby a worker who was preparing for an investigation inside the tank after the water filling test fell from the tank roof (height: approx. 10m) and passed away the next day.
  - From January 21, all works onsite were suspended to conduct a safety inspection.
  - A detailed investigation will be conducted to clarify the cause of this incident as well as striving to prevent recurrence.
**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

<table>
<thead>
<tr>
<th>Nuclide</th>
<th>2013 Highest Value</th>
<th>2013 Latest Value</th>
<th>2014 Latest Value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cesium-134</td>
<td>3.3 (2013/10/17) → ND(1.1)</td>
<td>Below 1/3</td>
<td>ND(1.6)</td>
<td>Sampled on January 19</td>
</tr>
<tr>
<td>Cesium-137</td>
<td>9.0 (2013/10/17) → ND(1.2)</td>
<td>Below 1/7</td>
<td>ND(1.3)</td>
<td></td>
</tr>
<tr>
<td>Gross β</td>
<td>74 (2013/8/19) → ND(16)</td>
<td>Below 1/4</td>
<td>Below 1/10</td>
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</tr>
<tr>
<td>Tritium</td>
<td>67 (2013/8/19) → 5.4</td>
<td>Below 1/10</td>
<td></td>
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</tr>
<tr>
<td>Cesium-134</td>
<td>4.4 (2013/12/24) → ND(1.3)</td>
<td>Below 1/3</td>
<td></td>
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</tr>
<tr>
<td>Cesium-137</td>
<td>10 (2013/12/24) → 1.2</td>
<td>Below 1/8</td>
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</tr>
<tr>
<td>Gross β</td>
<td>60 (2013/7/4) → ND(16)</td>
<td>Below 1/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tritium</td>
<td>59 (2013/8/19) → 6.7</td>
<td>Below 1/8</td>
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<tr>
<td>Cesium-134</td>
<td>5.0 (2013/12/2) → ND(1.0)</td>
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<tr>
<td>Cesium-137</td>
<td>8.4 (2013/12/2) → ND(1.3)</td>
<td>Below 1/6</td>
<td></td>
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</tr>
<tr>
<td>Gross β</td>
<td>69 (2013/8/19) → 16</td>
<td>Below 1/4</td>
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<tr>
<td>Tritium</td>
<td>52 (2013/8/19) → 5.1</td>
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<tr>
<td>Cesium-134</td>
<td>2.8 (2013/12/2) → ND(2.0)</td>
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<tr>
<td>Cesium-137</td>
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<tr>
<td>Gross β</td>
<td>46 (2013/8/19) → ND(18)</td>
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<tr>
<td>Tritium</td>
<td>24 (2013/8/19) → ND(3.1)</td>
<td>Below 1/7</td>
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<tr>
<td>Cesium-134</td>
<td>3.3 (2013/12/24) → ND(1.2)</td>
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<tr>
<td>Cesium-137</td>
<td>7.3 (2013/10/11) → ND(1.2)</td>
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<tr>
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<td>69 (2013/8/19) → ND(16)</td>
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<tr>
<td>Tritium</td>
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<tr>
<td>Cesium-134</td>
<td>3.5 (2013/10/17) → ND(1.3)</td>
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<tr>
<td>Cesium-137</td>
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<td>79 (2013/8/19) → ND(16)</td>
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<tr>
<td>Tritium</td>
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<td>Below 1/6</td>
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<tr>
<td>Cesium-134</td>
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<tr>
<td>Cesium-137</td>
<td>73 (2013/10/11) → 7.2</td>
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<tr>
<td>Gross β</td>
<td>320 (2013/8/12) → 40</td>
<td>Below 1/8</td>
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<tr>
<td>Tritium</td>
<td>510 (2013/9/2) → 460</td>
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</tbody>
</table>


Note: The gross β measurement values include natural potassium 40 (approx. 12 Bq/L).
### Status of seawater monitoring around outside of the port

**Comparison between the highest values in 2013 and the latest values**

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

#### Northeast side of Port Entrance (offshore 1km)
- Cesium-134: ND (2013) → ND (0.70)
- Cesium-137: ND (2013) → ND (0.74)
- Gross β: ND (2013) → ND (15)
- Tritium: 4.7 (2013/8/18) → ND (1.5) Below 1/3

#### East side of port entrance (offshore 1km)
- Cesium-134: ND (2013) → ND (0.44)
- Cesium-137: ND (2013) → ND (0.70)
- Gross β: ND (2013) → ND (15)
- Tritium: 6.4 (2013/10/18) → ND (1.5) Below 1/4

#### North side of north breakwater (offshore 0.5km)
- Cesium-134: 3.3 (2013/12/24) → ND (1.2) Below 1/2
- Cesium-137: 7.3 (2013/10/11) → ND (1.3) Below 1/5
- Gross β: 69 (2013/8/19) → ND (16) Below 1/4
- Tritium: 68 (2013/8/19) → 2.7 Below 1/20

#### North side of Units 5 and 6 discharge channel
- Cesium-134: 1.8 (2013/6/21) → ND (0.73) Below 1/3
- Cesium-137: 4.5 (2013/3/17) → ND (0.75) Below 1/6
- Gross β: 12 (2013/12/23) → 15
- Tritium: 8.6 (2013/6/26) → ND (1.6) Below 1/2

#### Southeast side of Port Entrance (offshore 1km)
- Cesium-134: ND (2013) → ND (0.76)
- Cesium-137: 1.6 (2013/10/18) → ND (0.67) Below 1/2
- Gross β: ND (2013) → ND (15)
- Tritium: 6 (2013/10/18) → ND (1.5) Below 1/4

#### South side of south breakwater (offshore 0.5km)
- Cesium-134: ND (2013) → ND (0.77)
- Cesium-137: ND (2013) → ND (0.65)
- Gross β: ND (2013) → ND (15)
- Tritium: ND (2013) → ND (1.5)

#### Around south discharge channel
- Cesium-134: ND (2013) → ND (0.79)
- Cesium-137: 3.0 (2013/7/15) → ND (0.60) Below 1/5
- Gross β: 15 (2013/12/23) → 13
- Tritium: 1.9 (2013/11/25) → ND (1.6)

#### Sea side impermeable wall

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**Summary of TEPCO data as of January 28**


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**Note:** The gross β measurement values include natural potassium 40 (approx. 12 Bq/L).
Status of efforts on various plans (Part 1)

**Phase 1** (no later than 2 years after the completion of the current efforts)

**2012**  
- Maintenance and monitoring of the cold shut down condition of nuclear reactor (by continuous monitoring on the continuation of water injections and parameters including temperature etc., preservation and improvement of reliability through maintenance and management)

**2013**  
- Narrowing down candidate systems for inserting alternative thermometer in Unit 1 RPV
- Installation of thermometer in Unit 2 RPV (including inspection in nuclear reactor)
- Review of the method for inserting alternative thermometer in Unit 1 RPV

**2014**  
- Partial observation of the PCV
- Improvement of the reliability of the circulating water injection cooling system (water intake from the turbine building) (Review/Implement measures to strengthen some materials for pipes, etc./improve earthquake resistance)

**2015**  
- Review on fuel removing method
- Construction of circulation loop in the building (for Units 1 to 3)
- HP 1-1: Selection of a fuel debris removing plan
- HP 2-1: Selection of a fuel debris removing plan
- HP 3-1: Selection of a fuel debris removing plan

**Phase 2** (Early period)

**2015**  
- Review on water take from reactor building (or from the bottom of the PCV - Construction work
- Inspection/review for early construction of the circulation loop in the building
- Construction of circulation loop in the building (for Units 1 to 3)
- Review on the method for inserting alternative thermometer in Unit 1 RPV
- Narrowing down of candidate systems for inserting alternative thermometer in Unit 3 RPV

**Main processes**  
- Field work  
- R&D  
- Review

**Sub-main processes**

**As of January 29, 2015**

**HP 1-1**
- Selection of a fuel debris removing plan
- Dismantling of building cover (including preparatory work)
- Removal of debris, decontamination and shielding

**HP 2-1**
- Selection of a fuel debris removing plan
- Decontamination, shielding, restoration of fuel handling equipment

**HP 3-1**
- Selection of a fuel debris removing plan
- Removal of debris
- Fuel removal
- Check

**Field work**

- Preparatory work/debris removing work
- Removal of debris, decontamination and shielding in the pool
- Construction of fuel removal cover/installation of fuel handling equipment
- Consideration/preparation for the decontamination and shielding in the building
- Decommissioning planning (preservation/improvement of reliability by maintenance management and facility update etc.)
- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

**R&D**

- Design and manufacturing of fuel removal cover
- Design and manufacturing of fuel handling machines
- Consideration, design and manufacturing of oxide compaction container
- Partial observation of the PCV
- Remote visual check of the PCV, direct measurement/evaluation of temperature etc.

**Review**

- Construction of fuel removal cover/installation of fuel handling equipment
- Construction of fuel removal cover/installation of fuel handling equipment
- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015

**Main processes**

- Field work  
- R&D  
- Review

**Sub-main processes**

**As of January 29, 2015**

**HP 1-1**
- Selection of a fuel debris removing plan
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- Selection of a fuel debris removing plan
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- Fuel removal
- Check

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- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015

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- R&D  
- Review

**Sub-main processes**

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**HP 1-1**
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- Construction of fuel removal cover/installation of fuel handling equipment
- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015

**Main processes**

- Field work  
- R&D  
- Review

**Sub-main processes**

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- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015

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- R&D  
- Review

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- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015

**Main processes**

- Field work  
- R&D  
- Review

**Sub-main processes**

**As of January 29, 2015**

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- Selection of a fuel debris removing plan
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- Fuel removal
- Check

**Field work**

- Preparatory work/debris removing work
- Removal of debris, decontamination and shielding in the pool
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- Consideration/preparation for the decontamination and shielding in the building
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- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

**R&D**

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- Design and manufacturing of fuel handling machines
- Consideration, design and manufacturing of oxide compaction container
- Partial observation of the PCV
- Remote visual check of the PCV, direct measurement/evaluation of temperature etc.

**Review**

- Construction of fuel removal cover/installation of fuel handling equipment
- Construction of fuel removal cover/installation of fuel handling equipment
- Construction of fuel removal cover/installation of fuel handling equipment
- As of January 29, 2015
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Phase 1 (no later than 2 years after the completion of the current efforts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2013</td>
</tr>
<tr>
<td>Review on decontamination technology/development of remote decontamination equipment</td>
<td></td>
</tr>
<tr>
<td>Development of remote contamination investigation technologies (1)</td>
<td></td>
</tr>
<tr>
<td>Development of remote decontamination technologies (1)</td>
<td></td>
</tr>
<tr>
<td>Site survey and on-site demonstration</td>
<td></td>
</tr>
<tr>
<td>Decontamination, shielding, etc. in the building (Work environment improvement (1))</td>
<td></td>
</tr>
<tr>
<td>First floor of the reactor building</td>
<td></td>
</tr>
<tr>
<td>Measures to reduce overall dose</td>
<td></td>
</tr>
<tr>
<td>Formulation of a comprehensive plan for exposure reduction</td>
<td></td>
</tr>
<tr>
<td>Grasping of the situation of work area</td>
<td></td>
</tr>
<tr>
<td>Formulation of work plan in the reactor building</td>
<td></td>
</tr>
<tr>
<td>Formulation of work plan on the floor with damage from explosion</td>
<td></td>
</tr>
<tr>
<td>Inspection/repair of leaking locations of the PCV</td>
<td></td>
</tr>
<tr>
<td>R&amp;D for inspection/repair of leaking locations of the PCV (including stop leakage between buildings)</td>
<td></td>
</tr>
<tr>
<td>Design, manufacturing and testing etc. of the equipment for inspecting the PCV (3), (6)</td>
<td></td>
</tr>
<tr>
<td>Units 1 and 3: Inspection of the basement of the nuclear reactor building, Inspection of leaking locations</td>
<td></td>
</tr>
<tr>
<td>Unit 2: Inspection of the basement of the nuclear reactor building, Inspection of leaking locations</td>
<td></td>
</tr>
<tr>
<td>▲ Objective: Establish decontamination robot technology</td>
<td></td>
</tr>
<tr>
<td>Fuel debris removal</td>
<td></td>
</tr>
<tr>
<td>R&amp;D toward the removal of fuel debris (to be continued to address long-term challenges including internal R&amp;D of equipment etc.)</td>
<td></td>
</tr>
<tr>
<td>Design, manufacturing and testing etc. of the equipment for inspecting the inside of the PCV (5)</td>
<td></td>
</tr>
<tr>
<td>Inspecting the inside of the PCV</td>
<td></td>
</tr>
<tr>
<td>Stable storage, processing/deposition of fuel debris after removal</td>
<td></td>
</tr>
<tr>
<td>Development of storage cans (surveys on existing technologies, review on storage systems, development of safety evaluation technique etc.)</td>
<td></td>
</tr>
<tr>
<td>Research on development of mock-up processing/disposal technologies</td>
<td></td>
</tr>
<tr>
<td>Establishment of nuclear material accountancy and control measures for the fuel debris</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Development of criticality evaluation and detection technologies</td>
<td></td>
</tr>
</tbody>
</table>

Status of efforts on various plans (Part 2)

As of January 29, 2015

- Green frame: Change from last month
- Red frame: New effort and/or change
- Blue frame: Change from last month
- Yellow frame: To be continued
## Status of efforts on various plans (Part 3)

<table>
<thead>
<tr>
<th>Challenges</th>
<th>The Phase 1 (no later than 2 years after the completion of the current efforts)</th>
<th>The Phase 2 (Early period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2013</td>
<td>2014</td>
</tr>
</tbody>
</table>

### Retained water treatment plan
- Objective: Implement the measures to improve the reliability of the current facilities
- Retained water treatment by means of existing treatment facilities
- Improving the reliability of the current facilities, etc.
- Replacement of branch pipes pressure hoses with PE pipes
- Measures to prevent the emission of tank leakage (Renforced concrete damming/ replacement by closed conduits), to be taken sequentially along with the installation of tanks
- Consideration of reducing the circular lines

### Plan for preventing the spread of marine pollution
- Objective: Reducing the risk of spreading radioactive strontium (Sr)
- Construction of sea side water barrier wall
- Installation of steel pipe sheet pile
- Consideration of technologies for decontaminating radioactive strontium (Sr)
- Seawater circulation purification
- Seawater purification by fibrous adsorbent material (ongoing)
- Monitoring of groundwater and seawater (implemented on an ongoing basis)

### Gas/liquid waste
- Objective: Control the radiation dose at the site boundary caused by radioactive substance etc.
- Reduction in radiation dose by shielding, etc.
- Reduced radiation dose by the purification of contaminated water etc.
- Land and marine environmental monitoring (implemented in an ongoing basis)

### Site decontamination plan
- Objective: Reduction to average 5 μSv/hour in the South side area on site except for around Units 1-4.
- Systematic implementation of decontamination in the site of power generation plant.
## Status of efforts on various plans (Part 4)

**Status as of January 29, 2015**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>The Phase 1 (no later than 2 years after the completion of the current efforts)</th>
<th>The Phase 2 (Early period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cask for both transport and storage</td>
<td>Cask manufacturing</td>
<td>-</td>
</tr>
<tr>
<td>Dry storage cask</td>
<td>Cask manufacturing</td>
<td>-</td>
</tr>
<tr>
<td>Harbor</td>
<td>Carrying-in of empty casks (sequential)</td>
<td>-</td>
</tr>
<tr>
<td>Common pool</td>
<td>Inspection of existing dry storage casks (9 pieces)</td>
<td>Retrieval of fuel from the common pool</td>
</tr>
<tr>
<td></td>
<td>Design/manufacturing of damaged fuel racks</td>
<td>Fixation</td>
</tr>
<tr>
<td></td>
<td>Storage of fuel retrieved from spent fuel pool (storage and management)</td>
<td>-</td>
</tr>
<tr>
<td>Temporary cask storage facility</td>
<td>Design and production</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Installation</td>
<td>Acceptance and interim storage of casks</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Evaluation of long-term integrity of fuel retrieved from spent fuel pool</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Examination of the processing method of damaged fuel etc. retrieved from spent fuel pool</td>
<td>-</td>
</tr>
<tr>
<td>Reactor building</td>
<td>Installation of reactor building</td>
<td>-</td>
</tr>
<tr>
<td>Preservation of the integrity of RPV/PCV</td>
<td>Development of evaluation technology for integrity against corrosion of RPV/PCV</td>
<td>Corrosion protection (Reduction in dissolved oxygen contained in reactor cooling water by means of nitrogen bubbling)</td>
</tr>
<tr>
<td>Storage and management plans for solid wastes</td>
<td>Design and manufacturing of incineration plants for miscellaneous solid wastes</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Establishment of drum storage facility</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Evaluation of secondary wastes from water treatment and lifespan of storage containers</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Facility renewal plan development</td>
<td>-</td>
</tr>
<tr>
<td>Processing and disposal plans for solid wastes</td>
<td>Development of R&amp;D plan for safety processing/disposal</td>
<td>Verification of applicability of processing/disposal technologies in Japan and foreign countries</td>
</tr>
<tr>
<td></td>
<td>Waste characterization (radiochemistry analysis, assessment of volume etc.)</td>
<td>-</td>
</tr>
<tr>
<td>Decommissioning plans for reactor facilities</td>
<td>Development of feasible and rational decommissioning scenarios</td>
<td>-</td>
</tr>
<tr>
<td>Implementation system and personnel procurement plan</td>
<td>Systematic cultivation/deployment of personnel, including the cooperative companies, and implementation of measures to stimulate motivation etc.</td>
<td>-</td>
</tr>
<tr>
<td>Plan to ensure the safety of work</td>
<td>Continuation of safety activities, maintenance and enhancement of radiation management, continuous assurance of medical services, etc.</td>
<td>-</td>
</tr>
</tbody>
</table>

**Main processes**
- Mass processes
- Sub-main processes

**Field work**
- R&D
- Review

**Green frame**: Change from last month

**Red frame**: HP ND-1
Progress toward decommissioning: Fuel removal from the spent fuel pool (SFP)

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

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 UH, 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.

Steps toward fuel removal

- Commence fuel removal from the Unit 1-3 Spent Fuel Pools
- Fuel removal status
- Conditions in the Unit 4 SFP
- Photo taken on February 21, 2012
- Photo taken on October 11, 2013
- Before removal of the large rubble
- After removal of the large rubble
- Image of the cover for fuel removal

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

Immediate check of the soundness of the Reactor Building

Since May 2012, regular quarterly inspections have been conducted, which have confirmed 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)

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. Two roof panels of the Unit 1 Reactor Building (R/B) were removed to facilitate this process. 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 (0.03 mSv/year) will be limited.

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.

Common pool

- Storage area
- 7 Modules
- Open space

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.

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

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.

Unit 1

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(*4) to investigate in clockwise and counter-clockwise directions.

[Status of investigation equipment development]
- Crawler-type equipment with a shape-changing structure which allows it to enter the PCV from the narrow access entrance (bore: 400mm) and stably move on the grating is currently under development. A field demonstration is scheduled for the 1st half of FY2015.

Status of equipment development toward investigating inside the PCV

Air dose rate inside the Reactor Building: Max. 5,150µSv/h (1F southeast area) (measured on July 4, 2012)

Nitrogen injection flow rate into the RPV(*2): 28.42Nm³/h

SFP(*2) temperature: 13.0℃

PCV hydrogen concentration:
- System A: 0.03vol% (measured on September 20, 2012)
- System B: 0.02vol% (measured on September 20, 2012)

Water level of the torus room approx. OP3,700 (measured on February 20, 2013)

Air dose rate inside the PCV: approx. 115µSv/h (measured on September 20, 2012)

Temperature inside the PCV approx. 19.2℃

Water level in the triangular corner: 32.4-32.6m (measured on September 20, 2012)

Temperature of accumulated water inside the torus room approx. 20.2-23℃ (measured on February 20, 2013)

Water level at the triangular corner: OP3,910-4,420 (measured on February 20, 2013)
Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

January 29, 2015

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

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 will be reinstalled within this fiscal year.

(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. 300 mm from the bottom.

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)

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

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.

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).

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. The investigative results will also be utilized to examine water stoppage and PCV repair methods.

Steps for investigation and equipment development
(1) Investigation from X-53 penetration
- 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.

Unit 3

Air dose rate inside the Reactor Building: Max. 4.780mSv/h (1F northeast area, in front of the equipment hatch) (measured on November 27, 2012)

Nitrogen injection flow rate into the RPV: -17.0Nm3/h

Temperature of the reactor building: 21.2°C

Air dose rate inside the torus room: 100-360mSv/h (measured on June 6, 2012)

Water level inside the PCV (measured on June 6, 2012)

Water level of the Turbine Building: OP2,558

Water level at the triangular corner: OP3,150

Water level at the 1st floor: OP3,150

Water level at the 1F grating: OP3,150

Temperature inside the torus: approx. 19°C

PCV hydrogen concentration System A: 0.07vol% System B: 0.07vol%

Nitrogen injection flow rate into the PCV: 566 Nm3/h

Reactor feed water system: 1.9m3/h

Core spray system: 2.5m3/h

Water level at the 1st floor: OP2,558

* Indices related to plant are values as of 11:00, November 26, 2014
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).

Typhoon measures improved for Tank Area
- Enhanced rainwater measures were implemented, including increasing the height of fences.

Toward treatment of all contaminated water
Regarding contaminated water treatment by multi-nucleide removal device (ALPS), etc., it is difficult to reach the initially anticipated performance due to technical reason. It is estimated that treatment of the entire amount of contaminated water would be in May 2015. Specific time of the completion will be announced by mid-March. Efforts will continue to improve treatment capability aiming to reduce risks as soon as possible.

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 Reactor Building to reduce the groundwater inflow (groundwater bypass) have been implemented. The pumped up groundwater is temporarily stored in tanks and released after TEPCO targeting efforts to commence freezing at the end of FY2014, drilling holes to install frozen pipes commenced from June 2, 2014.

To prevent the inflow of groundwater into the Reactor Buildings, installation of impermeable walls surrounding the buildings on the land side is planned. Targeting efforts to commence freezing at the end of FY2014, drilling holes to install frozen pipes commenced from June 2, 2014.
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 1 mSv/year at the site boundaries.
- Prevent contamination expansion in sea, decontamination within the site

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**Expansion of full-face mask unnecessary area**

Operation based on the rules for mask wearing according to radioactive material density in air and decontamination/ionization rules was defined, and the area is being expanded.

In the J tank installation area on the south side of the site, as decontamination was completed, the area will be set as full-face mask unnecessary area (from May 30, 2014), where for works not handling contaminated water, wearing disposable dust-protective masks will be deemed sufficient.

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**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.

**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
     - Preventing seepage of contaminated water was completed on August 9, 2013; 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 contaminated 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 14, 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
     - Drilling of holes to install frozen/temperature-measurement pipes is underway.

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**Expansion of work areas for women**

Regarding female workers engaged in radioactivity-related jobs at the Fukushima Daiichi Nuclear Power Station, there has been no onsite work area since the East Japan Great Earthquake due to the increased radioactivity rate. However, improved work environment conditions mean female workers have been allowed to work within limited onsite areas since June 2014.

Based on the improved onsite work environment and the reduced potential for internal exposure, work areas for female workers will be expanded site-wide, excluding specified high-dose works and those for which the radiation dose exceeds 4 mSv per exposure (from November 4, 2014).