Summary of Decommissioning and Contaminated Water Management

August 28, 2014

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

Main works and steps for the decommissioning

Fuel removal from Unit 4 SFP is underway. Preparatory works for fuel removal 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* → Unit 4: Fuel removal → Storage and handling

Unit 1: FY2017 Fuel removal will start (under consideration)
Unit 2: After FY2017 Fuel removal will start (under consideration)
Unit 3: FY2015 Fuel removal will start (planned)
Unit 4: 2014 Fuel removal will be completed

FHM*: Fuel Handling Machine

Fuel Debris (Corium) Removal

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

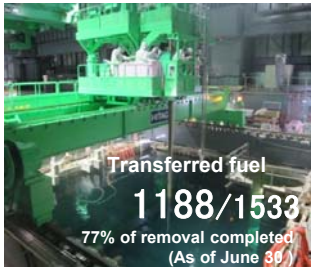
After FY2017
Water stoppage of PCV lower part (under consideration)

Dismantling Facilities

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

Fuel removal from SFP

Fuel removal from Unit 4 SFP has been underway since Nov. 18, 2013.
The work at Unit 4 will be accomplished around the end of 2014.



* Operation is suspended from July 1 to early September for crane inspection
(Fuel-removal operation)

Three principles for contaminated water countermeasures

Contaminated water countermeasures are implemented with the following three principles:

1. **Eliminate** contamination sources

① Multi-nuclide removal equipment

② Remove contaminated water in the trench (Note 2)

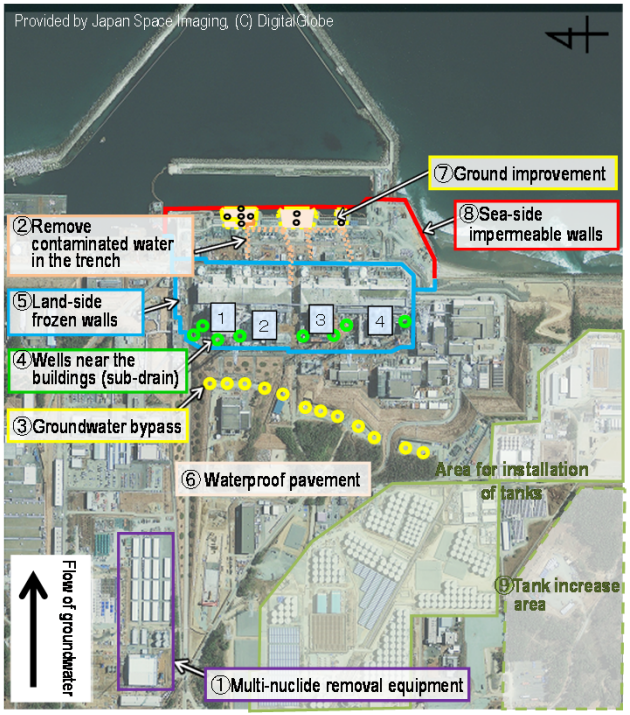
(Note 2) Underground tunnel containing pipes.

2. **Isolate** water from contamination

③ Pump up ground water for bypassing
④ Pump up ground water near buildings
⑤ Land-side frozen 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)

- This equipment removes radionuclides from the contaminated water in tanks, and reduces risks.
- It aims to reduce the levels of 62 nuclides in contaminated water to the legal release limit or lower (tritium cannot be removed).
- Furthermore, additional multi-nuclide removal equipment is installed by TEPCO as well as a subsidy project of the Japanese Government.

(Installation status of the facility to absorb radioactive materials)

Land-side impermeable walls with frozen soil

- The walls surround the buildings with frozen soil and reduce groundwater inflow into the same.
- On-site tests have been conducted since last August. Construction work started in June and the freezing operation will start within FY2014.

(Length: approx. 1,500m)

Sea-side impermeable walls

- The walls aim to prevent the flow of contaminated groundwater into the sea.
- Installation of steel sheet piles is almost (98%) complete. The time of closure 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. 25-45°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 current release of radioactive materials from the Reactor Buildings peaked at 0.03 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).

Additional and high-performance multi-nuclide removal equipment

Regarding multi-nuclide removal equipment (ALPS), 3-system operation has been maintained except for planned suspension from late June. Regarding the additional multi-nuclide removal equipment, test operation using high-density contaminated water will begin from mid-September. Regarding high-performance multi-nuclide removal equipment, similar test operation will begin from October. Work to verify the performance of the high-performance absorbent also began using the equipment for the verification test from August 20.

<Installation status of additional multi-nuclide removal equipment>

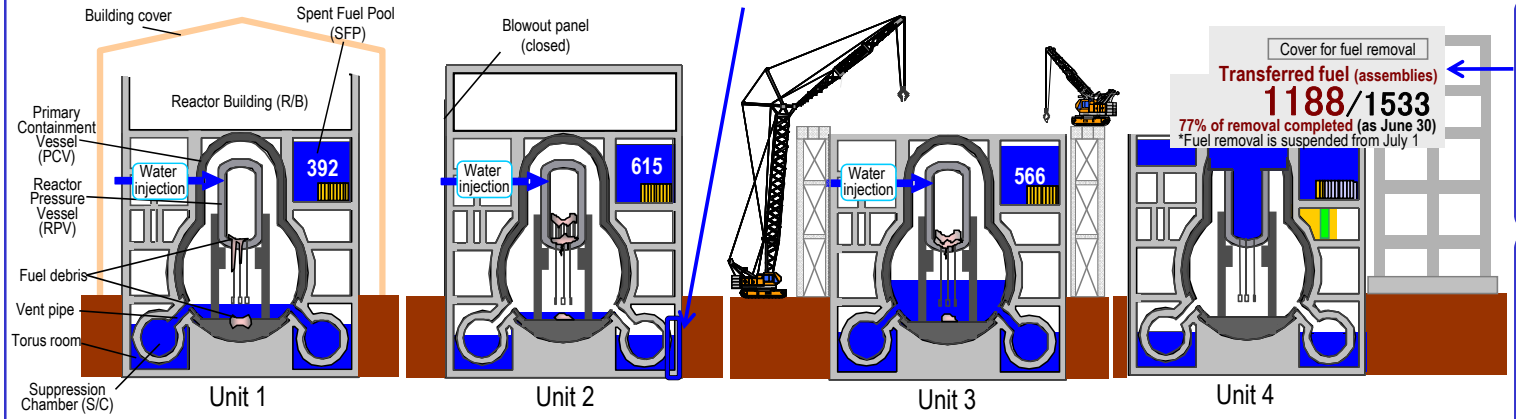
Additional measures for removing contaminated water from seawater pipe trenches

To remove high-density contaminated water remaining in the seawater pipe trenches(Note) of Units 2 and 3, there are plans to separate the trenches by freezing water at the connections with the buildings.
As the water could not be frozen at those points sufficiently, measures to enhance the cooling capability (injecting ice and installing more frozen pipes) have been conducted. Next, to accelerate freezing by controlling the water flow, additional measures such as injecting space fillers will be implemented and contaminated water inside the trenches steadily removed.
This measures for trenches, in which water is frozen, differ from the impermeable walls with frozen soil, in which underground water is frozen. Regarding the frozen-soil impermeable walls, the results of the demonstration conducted on site confirmed the freezing and construction toward freezing is underway.

Note) Seawater pipe trench: Tunnel containing pipes and cables

Performance verification test of purification system for subdrain water

To verify the performance of the equipment (purification system for subdrain water) to treat groundwater pumped from the well (subdrain) around the building, a performance verification test using groundwater pumped from the well was conducted on August 20.
The results showed that the quality of treated groundwater was under the operation target set of the groundwater bypass. Release of the treated groundwater will not begin without agreement by related parties.



Resumption of fuel removal at Unit 4 SFP

For the annual inspection of overhead cranes, fuel removal has been suspended since July 1.
Removal will resume from around September 4; targeting completion within 2014.

Establishment of Nuclear Damage Compensation and Decommissioning Facilitation Corporation

To accelerate the steady decommissioning led by the national government, the Nuclear Damage Compensation and Decommissioning Facilitation Corporation was established on August 18. Gathering expertise from Japan and abroad, the corporation will formulate plans and provide support for resolving mid- and long-term technical issues related to decommissioning.

Implementers of tritium separation technology verification project

Public offerings for implementers were made regarding the "Demonstration Project for Verification Tests of Tritium Separation Technologies" during the period from May 15 to July 17. Following technical screening by experts within and outside Japan, three implementers were adopted on August 26.

Installation of frozen pipes of frozen-soil impermeable walls started

As a measure to prevent any increase in contaminated water, the buildings will be surrounded by impermeable walls with frozen soil.
Aiming to start freezing by the end of this fiscal year, drilling of holes to install frozen pipes is underway. As of August 27, approx. 17% of drilling had been completed.
From August 4, installation of frozen pipes started.

Questionnaire survey of workers to improve the labor environment

To improve the labor environment of workers on site, a questionnaire survey is conducted from August 27.
The opinions and feedback collected will be summarized to and used to improve the labor environment.

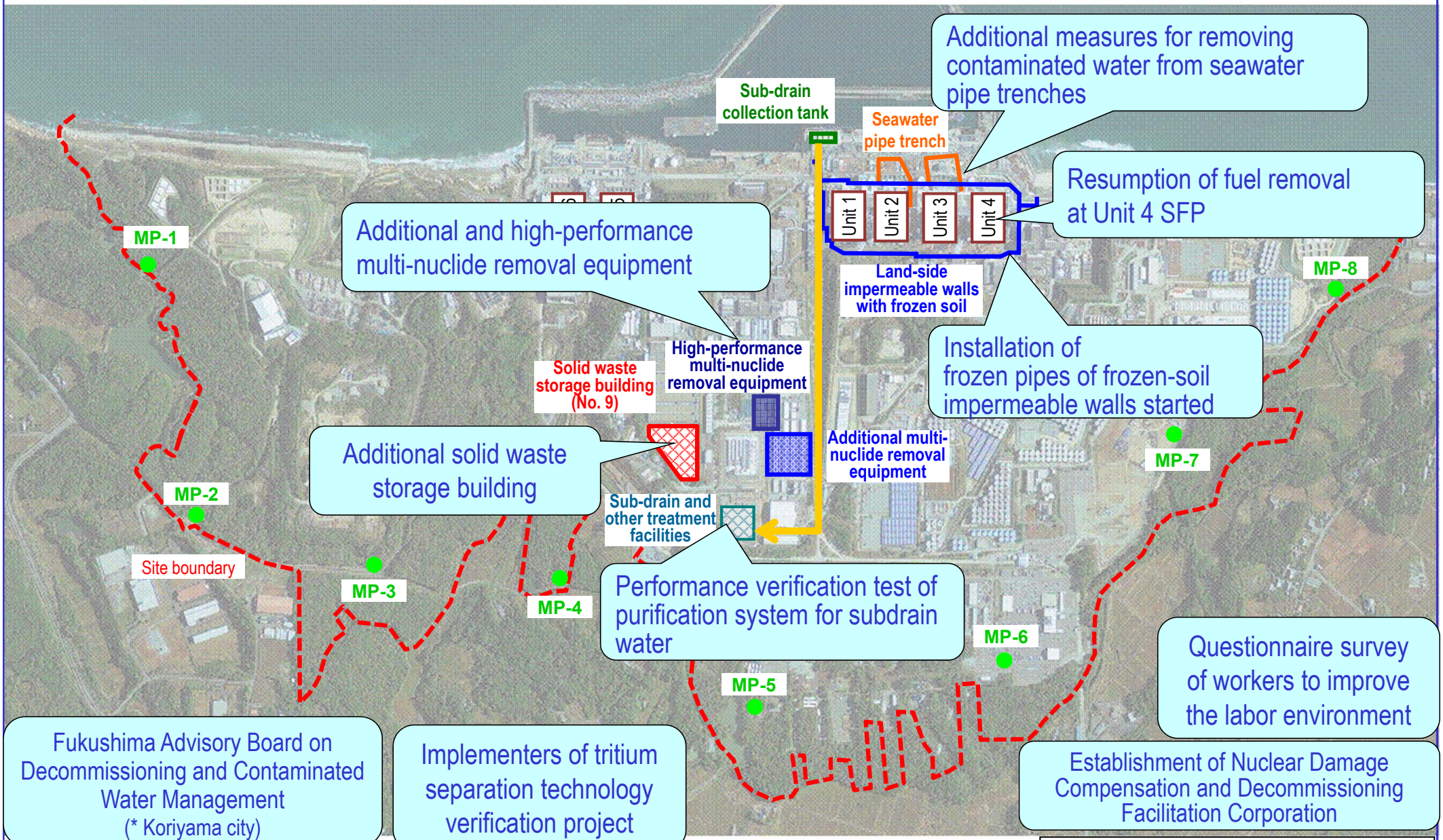
Additional solid waste storage building

As facilities to safely store rubble, an additional solid waste storage building (No. 9) with a capacity to store approx. 110,000 200L-drums will be constructed.
On August 13, the implementation plan was submitted. Targeting completion in January 2017, preparation is underway.

Fukushima Advisory Board on Decommissioning and Contaminated Water Management

On August 25, the 4th meeting was held (Koriyama city). Based on the feedback collected to date, efforts to provide easy-to-understand information related to decommissioning and measures for contaminated water of the Fukushima Daiichi Nuclear Power Station were introduced. Opinions regarding environmental improvement for workers supporting the field work were also delivered.

Major initiatives – Locations on site



Provided by Japan Space Imaging, (C) DigitalGlobe

* Data of Monitoring Posts (MP1-MP8).

Data of Monitoring Posts (MPs) measuring airborne radiation rate around site boundaries show 1.4 - 4.8μSv/h (August 1-26, 2014).

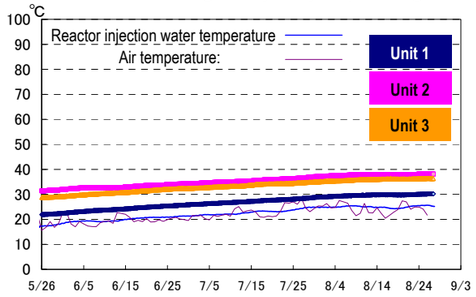
We improved the measurement conditions of monitoring post 2 to 8 for precise measurement of air dose rate. Construction works such as tree-clearing, surface soil removal, and shield wall setting were implemented from Feb 10 to Apr 18.Therefore monitoring results at these points are lower than other points 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, since the surrounding radiation dose has largely fallen down due to the further cutting down of the forests etc.

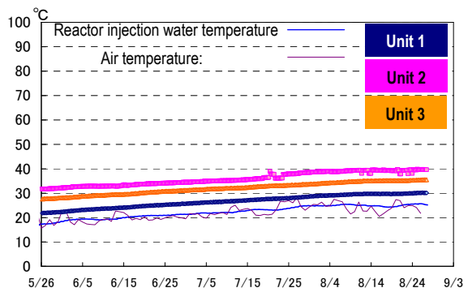
I. Confirmation of the reactor conditions

1. Temperatures inside the reactors

Through continuous reactor cooling by water injection, the temperatures of the Reactor Pressure Vessel (RPV) bottom and the Primary Containment Vessel (PCV) gas phase have been maintained within the range of approx. 25 to 45°C for the past month, though they vary depending on the unit and location of the thermometer.



RPV bottom temperatures (recent quarter)



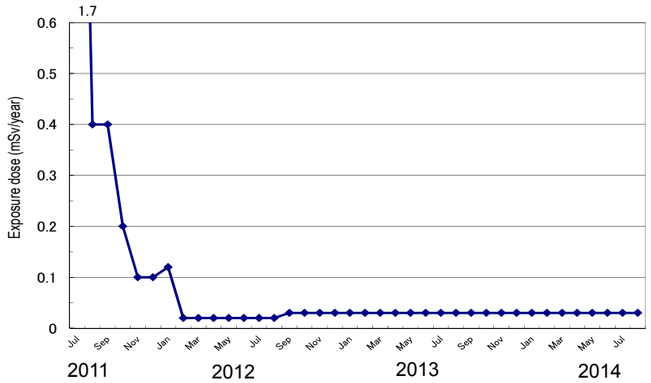
PCV gas phase temperatures (recent quarter)

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

2. Release of radioactive materials from the Reactor Buildings

The density of radioactive materials newly released from Reactor Building Units 1-4 in the air measured at site boundaries was evaluated at approx. 1.3 x 10^{-9} Bq/cm^3 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 1-4



(Reference)

* The density limit of radioactive materials in the air outside the surrounding monitoring area:
[Cs-134]: 2 x 10^{-5} Bq/cm^3
[Cs-137]: 3 x 10^{-5} Bq/cm^3

* 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/cm^3)
[Cs-137]: ND (Detection limit: approx. 2 x 10^{-7} Bq/cm^3)

* Data of Monitoring Posts (MP1-MP8).
Data of Monitoring Posts (MPs) measuring airborne radiation rate around site boundaries show 1.4 - 4.8μSv/h (August 1-26, 2014)
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) has been 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.

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

➢ Nitrogen injection test from the Unit 1 jet pump instrumentation rack

- To prepare for cases where nitrogen cannot be injected from the existing RPV head spray line, an alternative involving injecting nitrogen from the jet-pump instrumentation rack to the RPV was examined. The results of the soundness verification test conducted from July 28 to August 5 showed that nitrogen could be injected from that route. The results of the stability verification test that injected 20Nm^3/h from the jet pump instrumentation rack showed no change in the plant situation (August 20-27).

➢ 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. To help remove the thermometer, the effect of removal is being verified by mock-up test equipment using full-scale piping prepared for the test.

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, the operation of 12 groundwater bypass pumping wells commenced sequentially to pump up groundwater. Release was commenced from May 21 in the presence of officials from the Intergovernmental Liaison Office for the Decommissioning and Contaminated Water Issue of the Cabinet Office. As of August 27, 27,517 m^3 of groundwater had been released. The pumped up groundwater has been temporarily stored in tanks and released after TEPCO and the third-party organization (Japan Chemical Analysis Center) confirmed that its quality met operational targets.
- The groundwater level at pumping wells of the groundwater bypass is being decreased. It was confirmed that the groundwater level at observation holes had decreased by 20-30cm compared to the level before pumping at the groundwater bypass started (see Figure 1).
- As the analytical results of the groundwater bypass pumping well No. 12 (sampled on August 5) showed tritium density of 1,900Bq/L, which exceeded the operation target of 1,500Bq/L for the temporary storage tanks, pumping from that pumping well was suspended from August 6. As the assessment results on the temporary storage tank side based on the monitoring results (including analysis by a third-party organization) showed that the density would not exceed the operation target, pumping resumed from August 22. Regarding the groundwater bypass pumping well No. 12, enhanced monitoring of the tritium analytical result trends will continue.

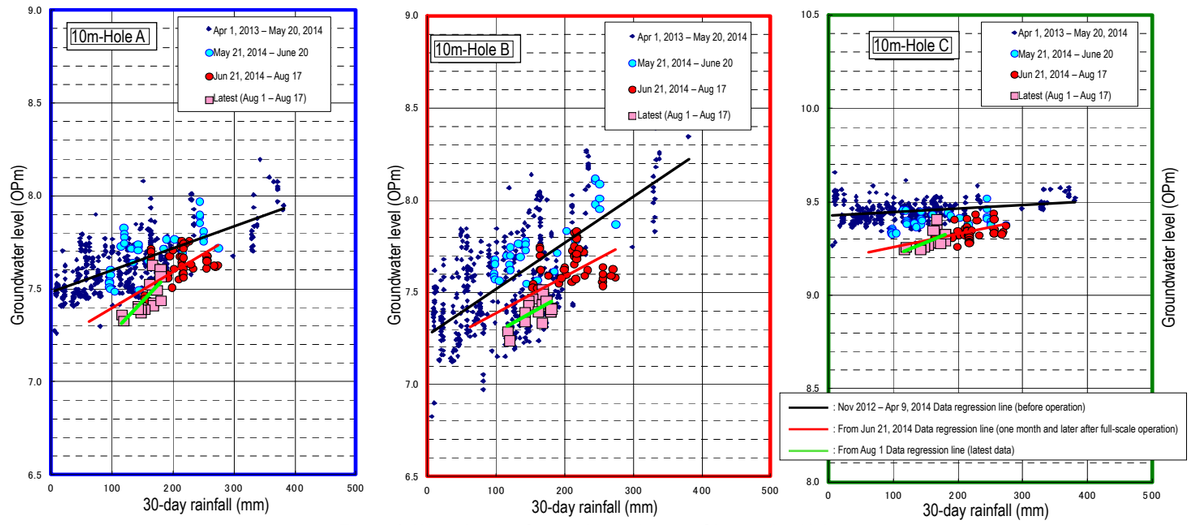


Figure 1: Water levels of groundwater bypass Observation Holes

➢ Construction status of impermeable walls with frozen soil

- To facilitate the installation of frozen-soil 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). As of August 27, drilling at 320 points (for frozen pipes: 276 of 1,545 points, for temperature-measurement pipes: 44 of 315 points) and installation of frozen pipes at 35 of 1,545 points had been completed (see Figure 2).

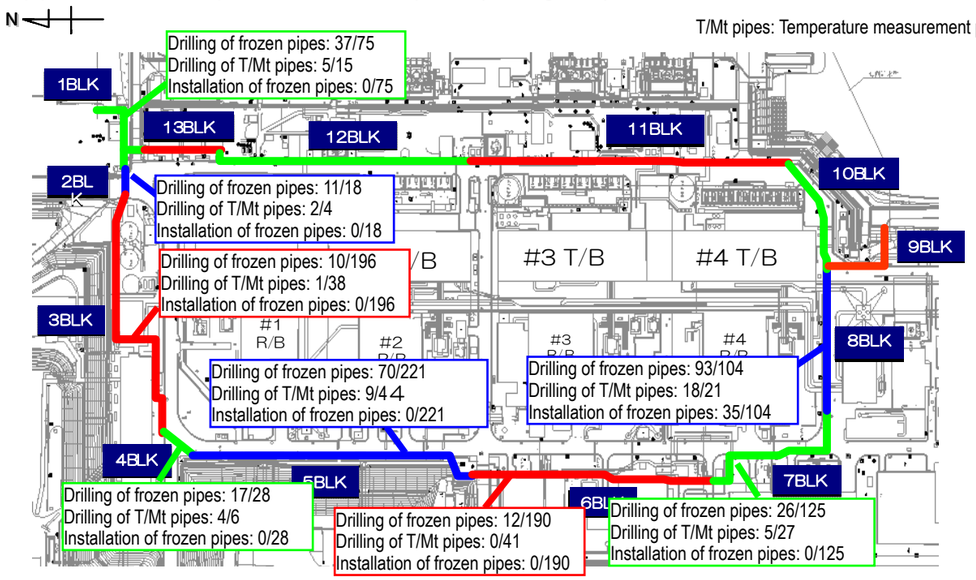


Figure 2: Status of drilling for frozen-soil impermeable walls and installation of frozen pipes

➢ Status of the subdrain system

- To facilitate installation of the subdrain system (by the end of September), drilling in 14 of 15 new pits was completed as of August 27.
- Regarding the purification system for subdrain water, construction of the building from March 12 and installation of equipment inside it from March 19 are underway. From August 12, groundwater was pumped from the subdrain pit to the collection tank (August 12-16). On August 20, a treatment performance verification test was conducted. Simple analytical results showed that cesium 134, cesium 137 and gross β radioactive materials were reduced under the detection limit and met the operational target set for the groundwater bypass.
- Treated groundwater will be released inside the port after confirming that it meets the above operation target. The release will be contingent on agreement by responsible governmental authorities and related parties in the fishery industry.

➢ Operation of multi-nuclide removal equipment

- Hot tests using radioactive water are underway (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013). To date, approx. 128,000 m^3 has been treated (as of August 26, including approx. 9,500m^3 stored in J1(D) tank, which contained water with a high density of radioactive materials at the System B outlet).
- Regarding System A, operation was suspended to replace the filters after iron coprecipitation treatment with improved filters (those improved based on slurry outflow due to degradation of the filter parts after carbonate treatment) (August 3-10). Treatment resumed from August 10.
- Regarding System B, operation was suspended to implement additional anti-corrosion measures and replace the filters with improved ones (July 21-August 1). Treatment was suspended from August 1.
- Regarding System C, after implementing additional anti-corrosion measures, operation continued since June 22. Operation will be suspended to replace the filters after iron coprecipitation treatment with improved filters in mid-September.
- Regarding the additional multi-nuclide removal equipment, construction of a foundation steel frame (from June 12) and installation of equipment (from June 21) are underway (see Figure 3). Installation of major equipment of System A was completed. The implementation was approved on August 27. From mid-September, hot tests will begin sequentially.
- Regarding the high-performance multi-nuclide removal equipment, a subsidy project of the Ministry of Economy, Trade and Industry, foundation construction (from May 10) and installation of equipment (from July 14) are underway (see Figure 4). Prior to the hot test beginning in October, a verification test to check removal performance and replacement cycle of the high-performance absorbent, the verification test is underway using the equipment installed for the test (from August 20).

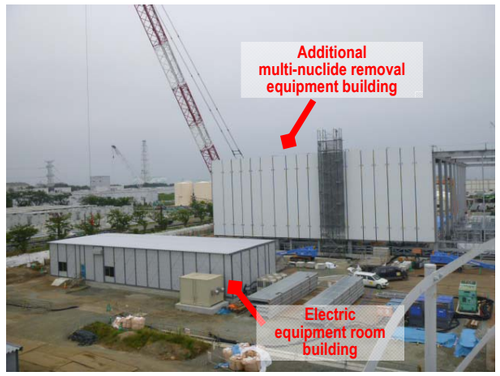


Figure 3: Overview of additional multi-nuclide removal equipment

Figure 4: Installation status of high-performance multi-nuclide removal equipment

➢ 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 (as of August 25, a total of 5,870 m^3).

➢ Treatment and removal of contaminated water from seawater pipe trenches

- As for the seawater pipe trench Unit 3, removal of cesium in contaminated water was suspended to prepare for freezing of the trench (July 28).
- To facilitate the removal of contaminated water in the seawater pipe trenches Unit 2, water stoppage by freezing two connections between the trench and Reactor Building is scheduled. The freezing operation is underway (Vertical Shaft A: from April 28, open-cut duct: from June 13). As the temperature did not decrease sufficiently, additional measures to facilitate freezing are being conducted sequentially (change from temperature-measurement pipes to frozen pipes: July 26, water injection: from July 30, injection of dry ice: from August 12, reduction in water level volatility: August 7-15). To facilitate freezing by controlling the water flow, a mock-up test for filling the space is underway.
- To facilitate the removal of contaminated water from the seawater pipe trenches Unit 3, water stoppage by freezing two connections between the trench and building is scheduled. Drilling of holes to install frozen pipes and temperature-measurement pipes is underway (from May 5).

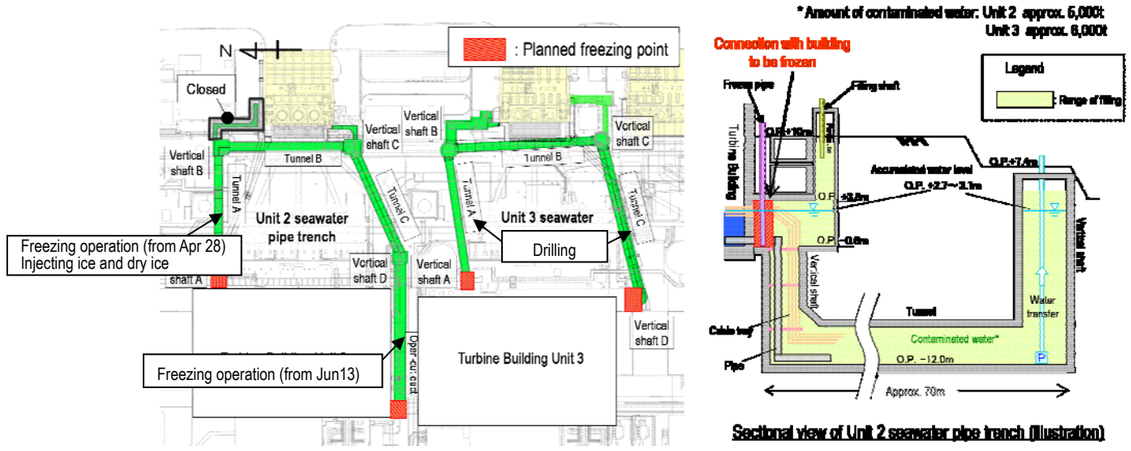


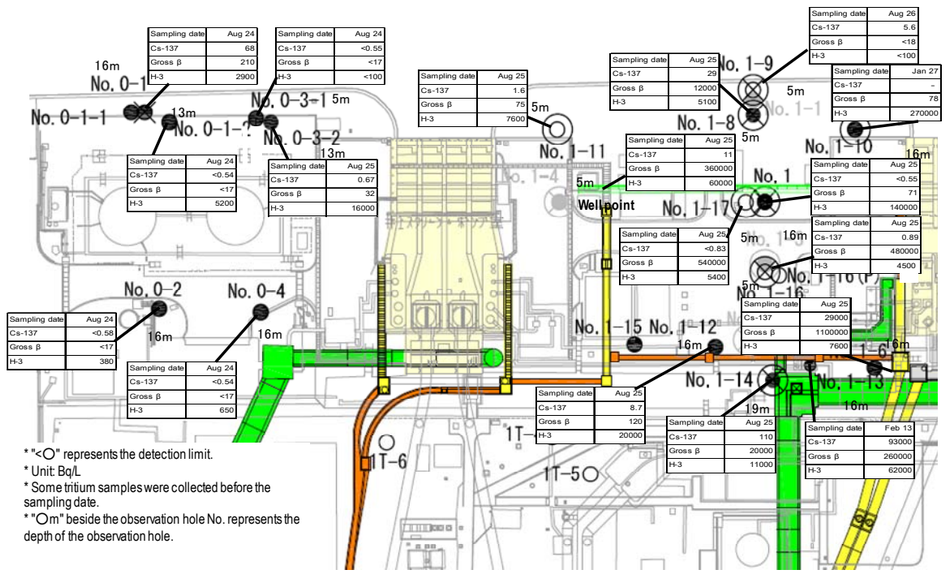
Figure 5: Freezing water stoppage image of seawater pipe trenches

3. Plan to reduce radiation dose and mitigate contamination

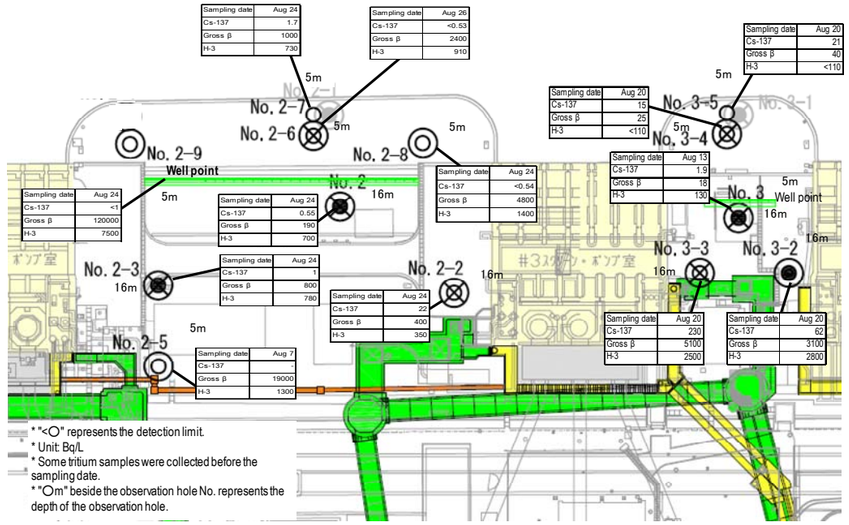
Effective dose-reduction at site boundaries and purification of the port water to mitigate the impact of radiation on the external environment

➢ 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, the density of tritium decreased at all groundwater Observation Holes as in July. Pumping of 1 m^3/day of water from Observation Hole No. 0-3-2 continues.
- Regarding the groundwater near the bank between the Unit 1 and 2 intakes, though the gross β radioactive materials at groundwater Observation Hole No. 1-16 increased to 3.1 million Bq/L on January 30, the figure has recently decreased to below one million Bq/L. The gross β radioactive materials at groundwater Observation Hole No. 1-17 started to increase since March. There may be a flow from groundwater Observation Hole Nos. 1-16, No.1-17 to the well point. Water pumping from the well point (approx. 40 m^3/day) and the pumping well No. 1-16 (P) (1m^3/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 density of gross β radioactive materials is high on the north (Unit 2) side as until July. Water pumping from north of the well point continues (4 m^3/day).
- Regarding the radioactive materials in groundwater near the bank between the Unit 3 and 4 intakes, a low density of radioactive materials has been maintained at all Observation Holes as until July.
- The density of radioactive materials in seawater inside the open channels of Units 1-4 has been declining slightly since last autumn. The density of radioactive materials in seawater at the additional sampling point installed outside the sea-side impermeable walls after March was equivalent to that at the point on the north side of the east breakwater.
- The density of radioactive materials in seawater within the port has been declining slowly as until July.
- The radioactive material density in seawater at and outside the port entrance has been maintained within the same range as previously.



<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

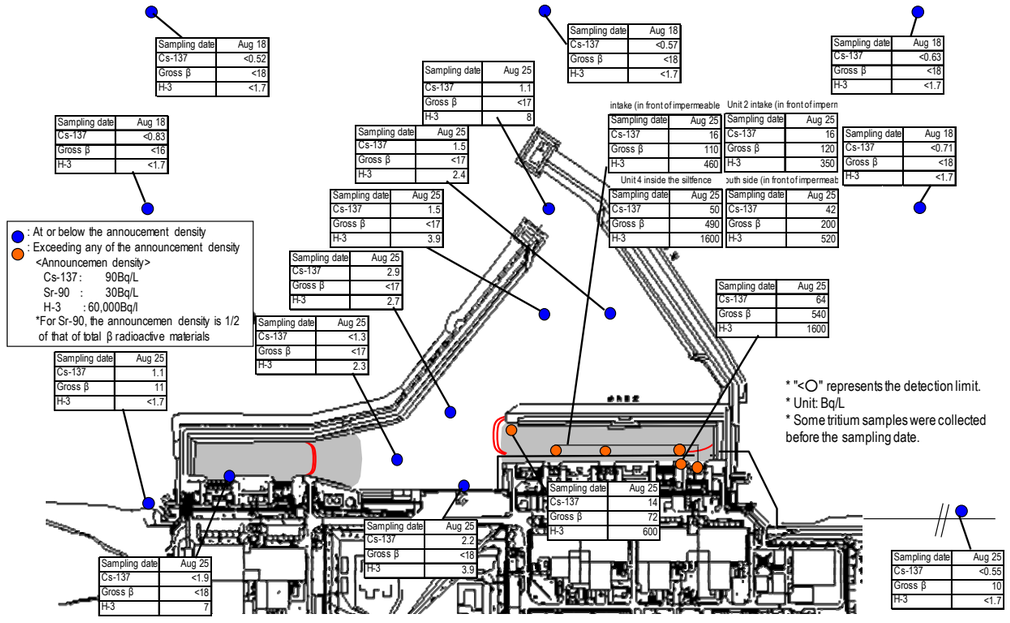


Figure 7: Seawater density around the port

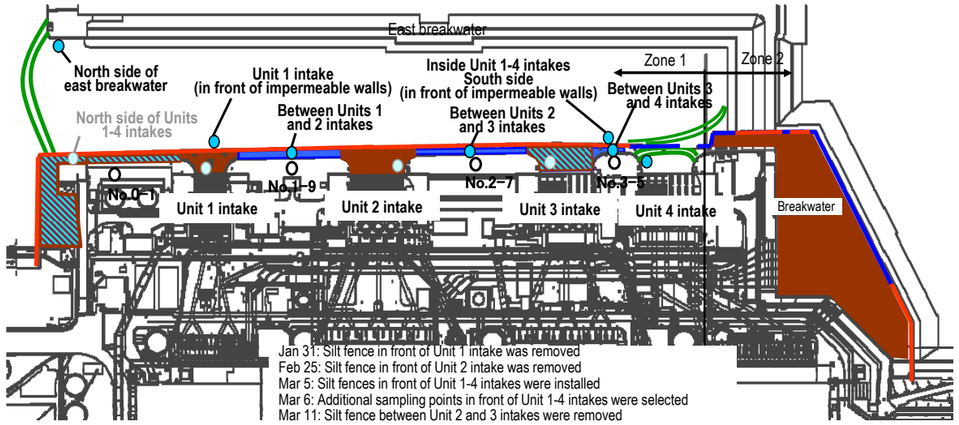


Figure 8: Progress status of impermeable walls on the sea side

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 efforts are being made to complete the process by around the end of 2014

➢ Fuel removal from the Unit 4 spent fuel pool

- Fuel removal from the spent fuel pool (SFP) commenced on November 18, 2013.
- For the annual inspection of overhead cranes of Unit 4 and the common pool, fuel removal has been suspended since July 1, and will resume from around September 4.
- In the common pool, a rack for deformed or damaged fuel is being installed (commenced on August 4 and scheduled for completion in mid-September).
- As of June 30, 1166 of 1331 spent fuel assemblies and 22 of 202 non-irradiated fuel assemblies had been transferred to the common pool. More than 77% of the fuel removal was completed.

➢ Main work to help remove spent fuel at Unit 3

- The removal of rubble inside the SFP was suspended due to failure of the brake on the crawler crane rotary (May 19). The brake for the rotary was replaced during the annual inspection of the crawler crane (from June 16 to the end of July 31). The removal of rubble resumed from August 25.

➢ Main work to help remove spent fuel at Unit 1

- In the crawler crane used to dismantle the building cover, degradation of vibration isolation rubber to absorb the engine vibration was detected. The parts were replaced and a comprehensive inspection of the crane was conducted (completed on August 8). Dismantling of the building cover will be restarted once preparation is complete.

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)

➢ Demonstration of investigative equipment for Unit 2 Suppression Chamber (S/C) lower external surface

- Regarding the investigative equipment for the S/C lower external surface being developed by the subsidy project "Development of investigation and repair (water stoppage) toward water filling of the Primary Containment Vessel" of the Ministry of Economy, Trade and Industry, a demonstration is being conducted on part of Unit 2 S/C (August 19 – September 4) (see Figure 9).

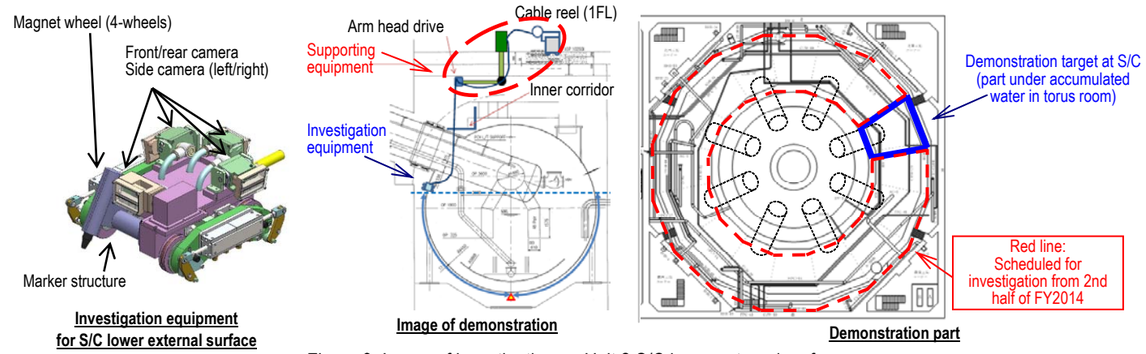


Figure 9: Image of investigation on Unit 2 S/C lower external surface

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

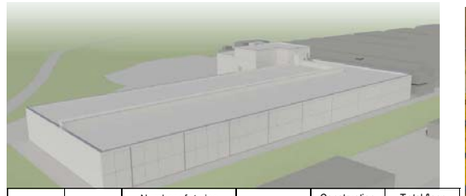
- As of the end of July, the total storage volume of concrete and metal rubble was approx. 107,500m^3 (+3,600m^3 compared to at the end of July, area occupation rate: 63%). The total storage volume of trimmed trees was approx. 77,300m^3 (+100m^3 compared to at the end of June, area occupation rate: 56%). The increase in rubble was mainly attributable to construction to install tanks, impermeable walls with frozen soil and additional multi-nuclide removal equipment.

➢ Management status of secondary waste from water treatment

- As of August 26, the total storage volume of waste sludge was 597 m^3 (area occupation rate: 85%). The total number of stored spent vessels and high-integrity containers (HIC) of multi-nuclide removal equipment was 1,042 (area occupation rate: 41%).

➢ Additional solid waste storage building (No. 9)

- To transfer and temporarily store rubble, which is temporarily stored or will be generated on site, at permanent facilities, an additional solid waste storage building (No. 9) capable of accommodating approx.110,000 200L-drums will be constructed; targeting completion by January 2017. On August 12, prior approval based on the safety agreement was obtained from Ohkuma and Futaba towns, in addition to the temporary soil cover-type storage (No. 3 and 4 pools). On August 13, the implementation plan was submitted.



Seismic class	Structure	Number of stories		Eave height (m)	Construction area (m^2)	Total floor area (m^2)
		Under-ground	Above the ground			
C	RC	2	2 + PH	Approx. 15.4	Approx. 6,800	Approx. 27,000

∗RC: Reinforced concrete, PH: Penthouse

Image of the building

Drum cans (also used for burned ash)

Square containers (high radiation rubble)

Image of storage

Figure 10: Outline of solid waste storage building (No.9)

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 April to June was approx. 11,800 (TEPCO and partner company workers), which exceeds the monthly average number of actual workers (approx. 8,500). 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 September (approx. 6,030 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 5,700 per month since the last fiscal year (See Figure 11)

  * Some works with which contract procedures have yet to be completed are excluded from the September estimate.

- The number of workers is increasing, both those 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 July was approx. 45%.

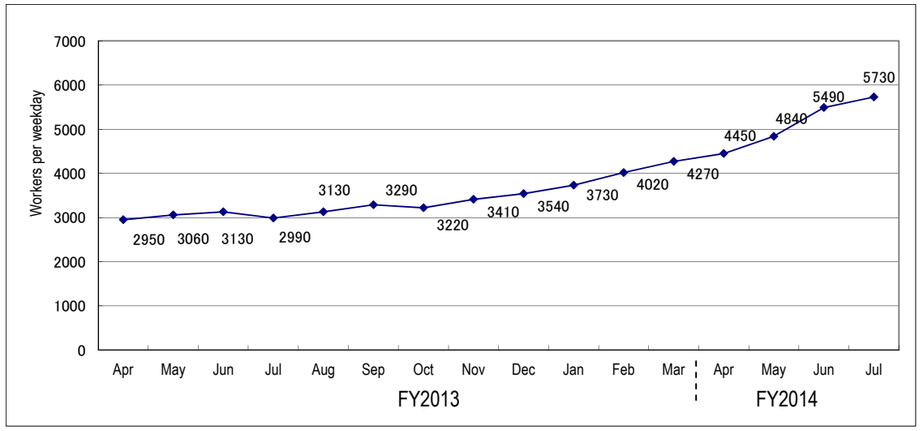


Figure 11: Changes in the average number of workers per weekday for each month since fiscal 2013 (actual values)

- The average exposure dose of workers remained at approx. 1mSv/month by implementing measures to reduce the exposure dose, and allocating/relocating workers as required based on the forecast dose for each work. (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.

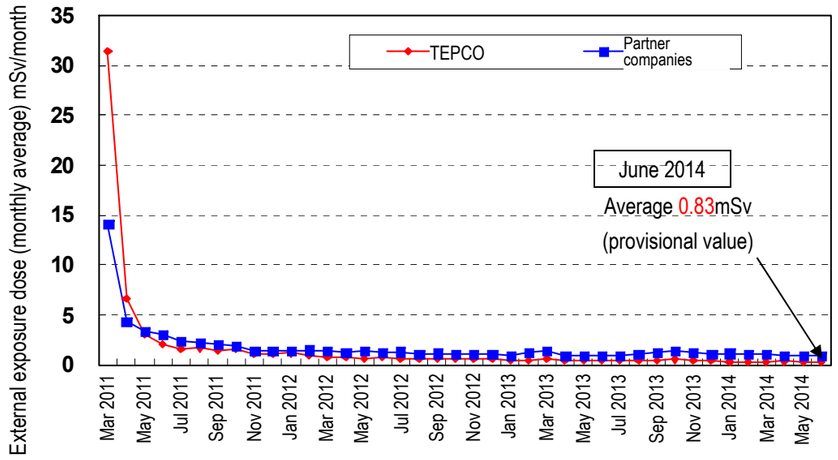


Figure 12: Changes in monthly individual worker exposure dose
(monthly average exposure dose since March 2011)

➢ Questionnaire survey of workers to improve the labor environment

- To improve the labor environment of workers on site, a questionnaire survey is conducted from August 27. The opinions and feedback collected will be summarized and used to improve the labor environment.

➢ Outbreak status of heat stroke

- This fiscal year, a total of 30 workers got heat stroke as of August 27, 13 of whom due to work and potential patients. Continued measures will be taken to prevent heat stroke. (Last year, 15 workers had heat stroke as of the end of August, with causes for seven persons attributable to work and potential patients)
- Continued from last year, measures to prevent heat stroke were implemented from May to cope with the hottest season.
  - ✓ Using WBGT (*), work time, the frequency and timing of breaks, and work intensity were altered.
  - ✓ Work under the blazing sun is prohibited in principle from 14:00 to 17:00 in July and August.
  - ✓ Appropriate rest and frequent intake of water and salt are encouraged.
  - ✓ Physical management using check sheets and wearing cool vests.
  - ✓ A workplace environment where workers are allowed to claim poorly conditions is established and early diagnosis at the emergency medical room is encouraged.

  WBGT: Index using three perspectives of humidity, radiation heat, and temperature, which significantly impact on the heat balance of human bodies
- The cooperation of prime contractors is requested regarding the following the unified rules related to outdoor work:
  - ✓ When the WBGT value is 25℃ or higher, limit the work time up to two hours.
    (after 2-hour work, workers are required to remove the mask and take water and salt at the rest house)
  - ✓ Before starting, workers measure their own body temperature, blood pressure and alcohol level, and their primary contractor manages the data.
  - ✓ When the WBGT value is 30℃ or higher, workers are not allowed to work during that shift, in principle.
    (checked using the WBGT forecast values at Namie and values measured at other workplaces, excluding routine works such as patrolling contaminated water tanks or works whereby enhanced measures to prevent heat stroke were notified to the department with primary responsibility)
- As a rest place where workers can eat and drink without wearing masks, a mobile rest house (van-type) is operated from August 12.

8. Others

➢ Establishment of the Nuclear Damage Compensation and Decommissioning Facilitation Corporation

- The Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) was established on August 18. NDF implements following measures for the decommissions of the failed NPPs: (1) Strategy planning of important issues including fuel debris retrieval and waste management, (2) Planning and schedule control of R&Ds needed, (3) Support of schedule control of key items, (4) Enhancement of international cooperation.

➢ 4th meeting of the Fukushima Advisory Board on Decommissioning and Contaminated Water Management

- On August 25, the 4th meeting was held (Koriyama city). The current status of the Fukushima Daiichi Nuclear Power Station and approaches toward decommissioning were introduced using video contents prepared based on feedback collected to date, to explain the efforts to provide information related to decommissioning and measures for contaminated water at the station as well as responding to related questions in an easy-to-understand manner. Opinions toward further improvement in information provision and comments regarding environmental improvement for workers supporting the field work were delivered.

➢ Implementers of “Validation of technologies for contaminated water management project (Demonstration Project for Verification Tests of Tritium Separation Technologies)” were decided

- As tritium remains without being removed from contaminated water generated on site, to collect the latest insights related to tritium separation technology, both from Japan and abroad, public offerings were made regarding the “Demonstration Project for Verification Tests of Tritium Separation Technologies” during the period from May 15 to July 17. Following technical screening by experts within and outside Japan, three implementers (all from abroad) were adopted on August 26.

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 August 18-25)"; unit (Bq/L); ND represents a value below the detection limit

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

Sea side impermeable wall
Silt fence

【Port entrance】
【South side in the port】
【East side in the port】
【West side in the port】
【North side in the port】
【In front of Unit 6 intake】
【In front of shallow draft quay】

Cesium-134:	3.3 (2013/10/17) →	ND(1.1)	Below 1/3
Cesium-137:	9.0 (2013/10/17) →	1.5	Below 1/6
Gross β:	74 (2013/ 8/19) →	ND(17)	Below 1/4
Tritium:	67 (2013/ 8/19) →	3.9	Below 1/10

Cesium-134:	3.3 (2013/12/24) →	ND(1.1)	Below 1/3
Cesium-137:	7.3 (2013/10/11) →	1.1	Below 1/6
Gross β:	69 (2013/ 8/19) →	ND(17)	Below 1/4
Tritium:	68 (2013/ 8/19) →	8.0	Below 1/8

Cesium-134:	4.4 (2013/12/24) →	ND(1.4)	Below 1/3
Cesium-137:	10 (2013/12/24) →	2.9	Below 1/3
Gross β:	60 (2013/ 7/ 4) →	ND(17)	Below 1/3
Tritium:	59 (2013/ 8/19) →	2.7	Below 1/20

Cesium-134:	3.5 (2013/10/17) →	ND(1.1)	Below 1/3
Cesium-137:	7.8 (2013/10/17) →	1.5	Below 1/5
Gross β:	79 (2013/ 8/19) →	ND(17)	Below 1/4
Tritium:	60 (2013/ 8/19) →	2.4	Below 1/20

Cesium-134:	5.0 (2013/12/2) →	ND(1.5)	Below 1/3
Cesium-137:	8.4 (2013/12/2) →	ND(1.3)	Below 1/6
Gross β:	69 (2013/8/19) →	ND(17)	Below 1/4
Tritium:	52 (2013/8/19) →	2.3	Below 1/20

Cesium-134:	32 (2013/10/11) →	4.5	Below 1/7
Cesium-137:	73 (2013/10/11) →	14	Below 1/5
Gross β:	320 (2013/ 8/12) →	72	Below 1/4
Tritium:	510 (2013/ 9/ 2) →	600	

Cesium-134:	2.8 (2013/12/2) →	ND(1.7)	Below 7/10
Cesium-137:	5.8 (2013/12/2) →	ND(1.9)	Below 1/3
Gross β:	46 (2013/8/19) →	ND(18)	Below 1/2
Tritium:	24 (2013/8/19) →	7.0	Below 1/3

Cesium-134:	5.6		
Cesium-137:	16		
Gross β:	110		
Tritium:	460	*	

Cesium-134:	4.5		
Cesium-137:	16		
Gross β:	120		
Tritium:	350	*	

Cesium-134:	13		
Cesium-137:	42		
Gross β:	200		
Tritium:	520	*	

* Monitoring commenced in or after March 2014

Cesium-134:	62 (2013/ 9/16)→	16	Below 1/3
Cesium-137:	140 (2013/ 9/16)→	50	Below 1/2
Gross β:	360 (2013/ 8/12)→	490	
Tritium:	400 (2013/ 8/12)→	1,600	

Cesium-134:	5.3 (2013/8/ 5) →	ND(1.8)	Below 1/2
Cesium-137:	8.6 (2013/8/ 5) →	2.2	Below 1/3
Gross β:	40 (2013/7/ 3) →	ND(18)	Below 1/2
Tritium:	340 (2013/6/26) →	3.9	Below 1/80

Cesium-134:	28 (2013/ 9/16)→	19	Below 7/10
Cesium-137:	53 (2013/12/16)→	64	
Gross β:	390 (2013/ 8/12)→	470	
Tritium:	650 (2013/ 8/12)→	1,600	

	Legal discharge limit
Cesium-134	60
Cesium-137	90
Strontium-90 (strongly correlate with Gross β)	30
Tritium	60,000

Summary of TEPCO data as of August 27

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 August 12-25)

	Legal discharge limit
Cesium-134	60
Cesium-137	90
Strontium-90 (strongly correlate with Gross β)	30
Tritium	60, 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 (0.66)
Cesium-137: ND (2013) → ND (0.58)
Gross β: ND (2013) → ND (16)
Tritium: ND (2013) → ND (1.6)

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

Cesium-134: ND (2013) → ND (0.88)
Cesium-137: 1.6 (2013/10/18) → ND (0.67) Below 1/2
Gross β: ND (2013) → ND (16)
Tritium: 6.4 (2013/10/18) → ND (1.6) Below 1/3

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

Cesium-134: ND (2013) → ND (0.65)
Cesium-137: ND (2013) → ND (0.56)
Gross β: ND (2013) → ND (16)
Tritium: ND (2013) → ND (1.6)

Cesium-134: ND (2013) → ND (0.74)
Cesium-137: ND (2013) → ND (0.82)
Gross β: ND (2013) → ND (16)
Tritium: 4.7 (2013/ 8/18) → ND (1.6) Below 1/2

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

【Port entrance】

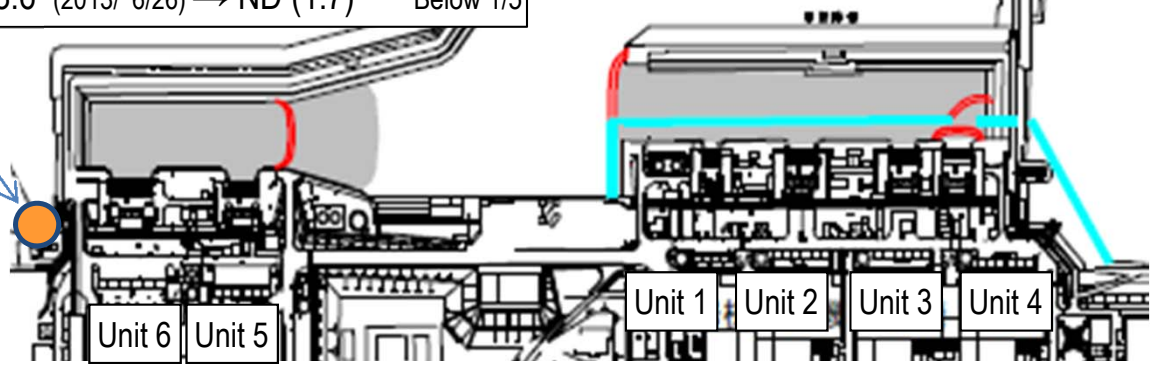
Cesium-134: 3.3 (2013/12/24) → ND (1.1) Below 1/3
Cesium-137: 7.3 (2013/10/11) → 1.1 Below 1/6
Gross β: 69 (2013/ 8/19) → ND (17) Below 1/4
Tritium: 68 (2013/ 8/19) → 8.0 Below 1/8

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

Cesium-134: ND (2013) → ND (0.64)
Cesium-137: ND (2013) → ND (0.50)
Gross β: ND (2013) → ND (16)
Tritium: ND (2013) → ND (1.6)

【North side of Units 5 and 6 discharge channel】

Cesium-134: 1.8 (2013/ 6/21) → ND (0.73) Below 1/2
Cesium-137: 4.5 (2013/ 3/17) → 1.1 Below 1/4
Gross β: 12 (2013/12/23) → 11
Tritium: 8.6 (2013/ 6/26) → ND (1.7) Below 1/5



Sea side impermeable wall

Silt fence

Cesium-134: ND (2013) → ND (0.64)
Cesium-137: 3.0 (2013/ 7/15) → ND (0.55) Below 1/5
Gross β: 15 (2013/12/23) → 10 Below 7/10
Tritium: 1.9 (2013/11/25) → ND (1.7) Below 9/10

【Around south discharge channel】

Summary of TEPCO data as of August 27

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

Appendix 2

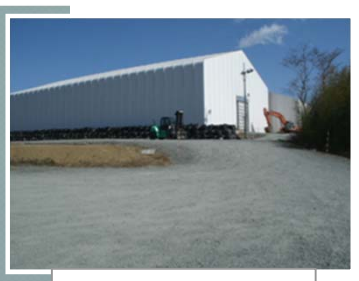
August 28, 2014

TEPCO Fukushima Daiichi Nuclear Power Station Site Layout

- Rubble storage area
- Rubble storage area (planned)
- Trimmed trees area
- Trimmed trees area (planned)
- Mid-/ low-level contaminated water
- Mid-/ low-level contaminated water tank (planned)
- High-level contaminated water tank
- High-level contaminated water tank (planned)
- Multi-nuclide removal equipment
- Treatment facility for sub-drain water (planned)
- Dry cask temporary storage facility

Inside the rubble storage tent

Rubble (container storage)



Rubble storage tent

Temporary soil cover type storage

Rubble (outdoor accumulation)

Solid waste storage

Rubble (outdoor accumulation)

Temporary trimmed trees storage pool

Trimmed trees (outdoor accumulation)

Miscellaneous Solid Waste Volume Reduction Treatment Building (Instllation underway)

Futaba town

Unit 6

Unit 5

Town boundary

Mega float

Ohkuma town

Chiller for reactor water injection facility

Pipe route

Unit 1

Unit 2

Unit 3

Unit 4

Land-side impermeable walls with frozen soil (Instllation underway)

Frozen soil impermeable wall demonstration test

Sea side impermeable wall (Instllation underway)

Cesium absorption apparatus (Incineration Workshop Building)

Decontamination instruments (Process Building)

Cesium absorption vessel temporary storage

Temporary waste sludge storage

High-level accumulated water reception tank (emergency reception)

Mid-/ low-level fresh water tank

Spent absorption vessel temporary storage

Spent absorption vessel temporary storage (multi-nuclide removal equipment, etc.)

Site boundary

Vehicles maintenance site

Vehicle screening and decontamination site

Temporary Administration Office Building (planned)

Administration Office Building (planned)

Temporary rest house outside the site

Large rest house (Under construction)

Access control facility

Purification system for subdrain water

Dry cask temporary storage facility

Main Anti-Earthquake Building

Multi-nuclide removal

High-performance multi-nuclide removal equipment (planned)

Additional multi-nuclide removal equipment (planned)

Spent absorption vessel temporary storage

Underground reservoirs

Temporary trimmed trees storage pool

Groundwater bypass temporary storage tank

Underground reservoirs

Common pool

2nd cesium absorption apparatus (HTI Building)

Water desalinations (evaporative concentration)

Water desalinations (RO)

Trimmed trees

Rubble

Tank installation status

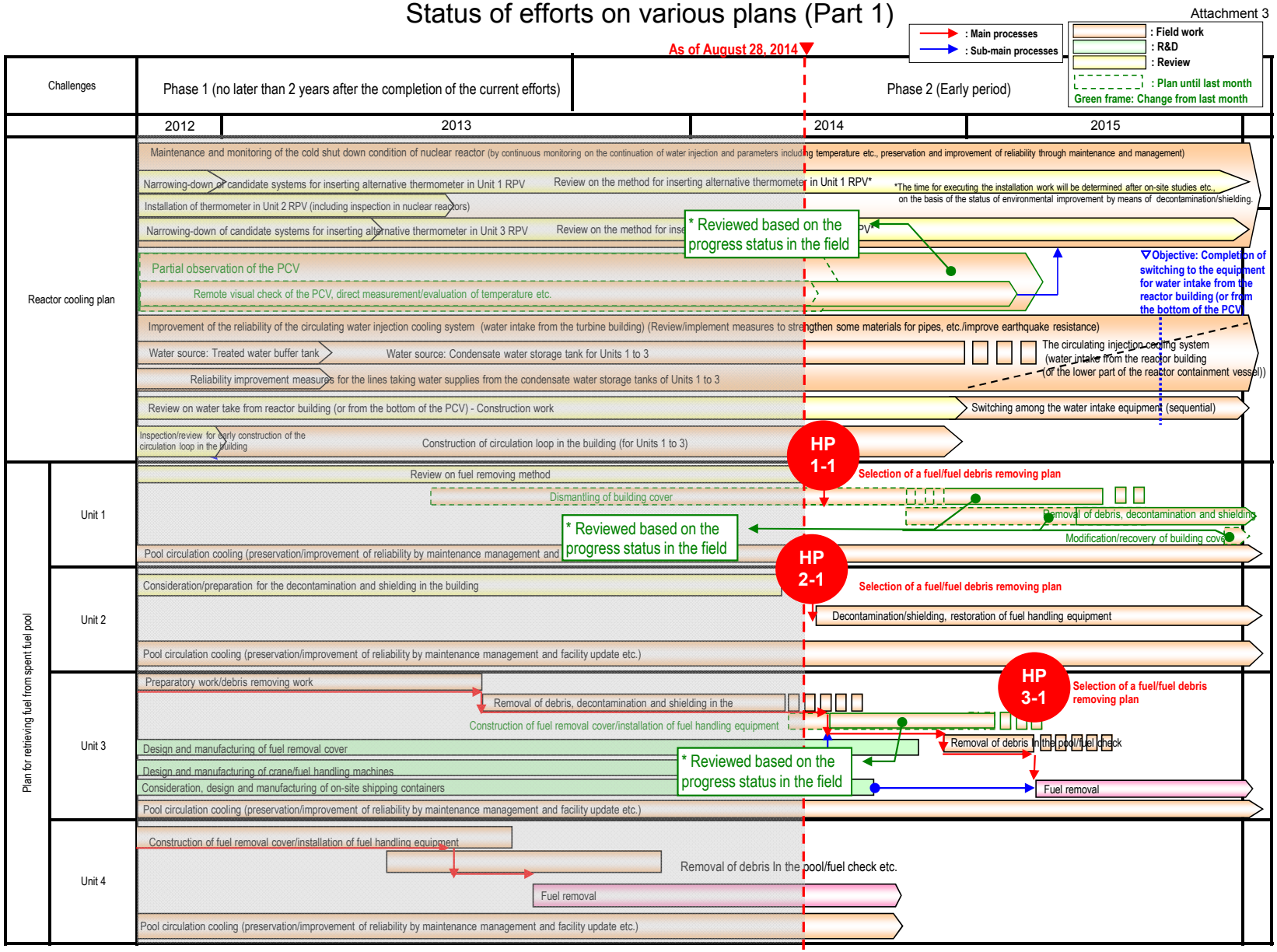
Temporary waste sludge storage

Provided by Japan Space Imaging Corporation, (C)DigitalGlobe

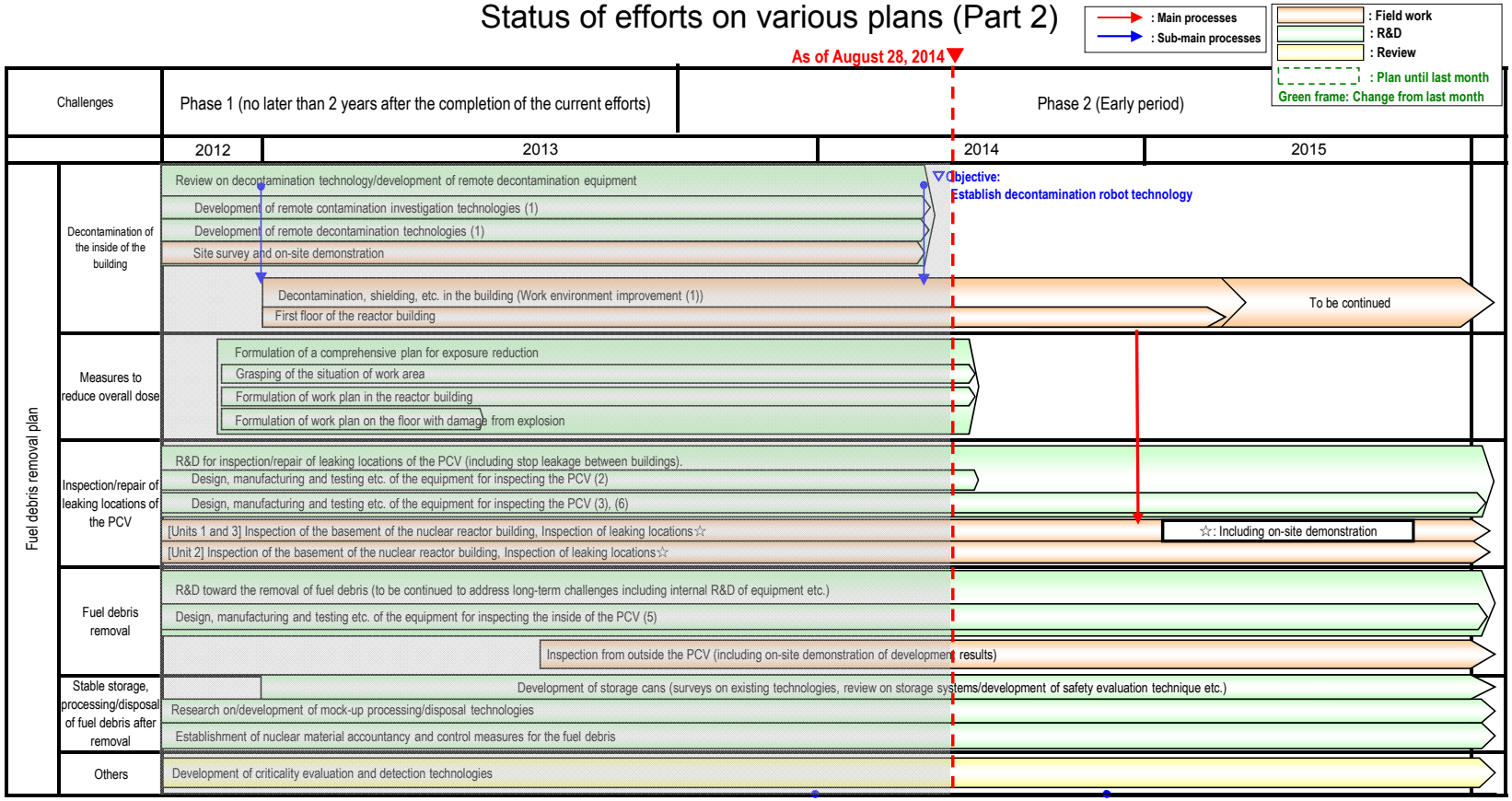
0m 100m 500m 1000m

Attachment 3

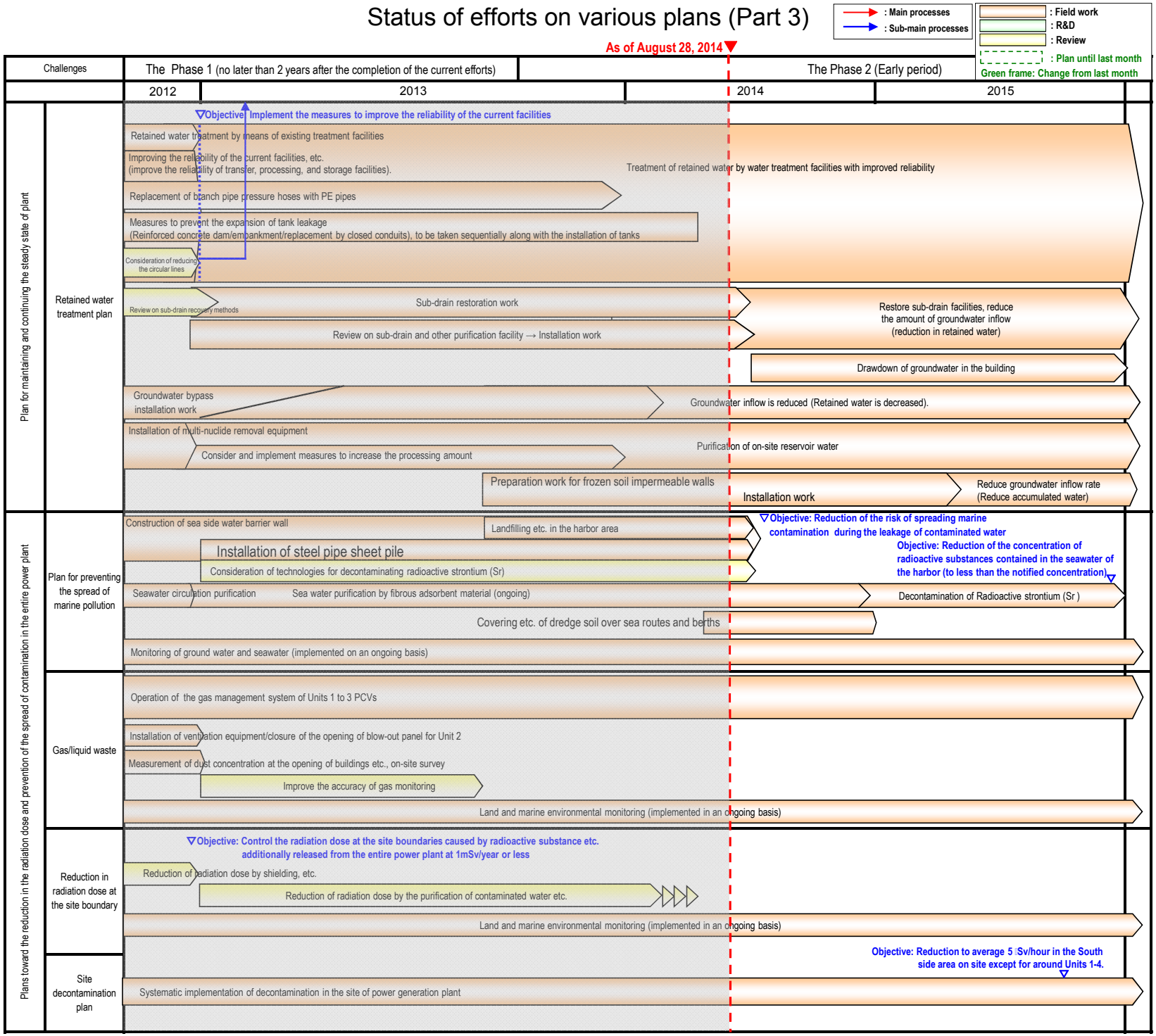
Status of efforts on various plans (Part 1)



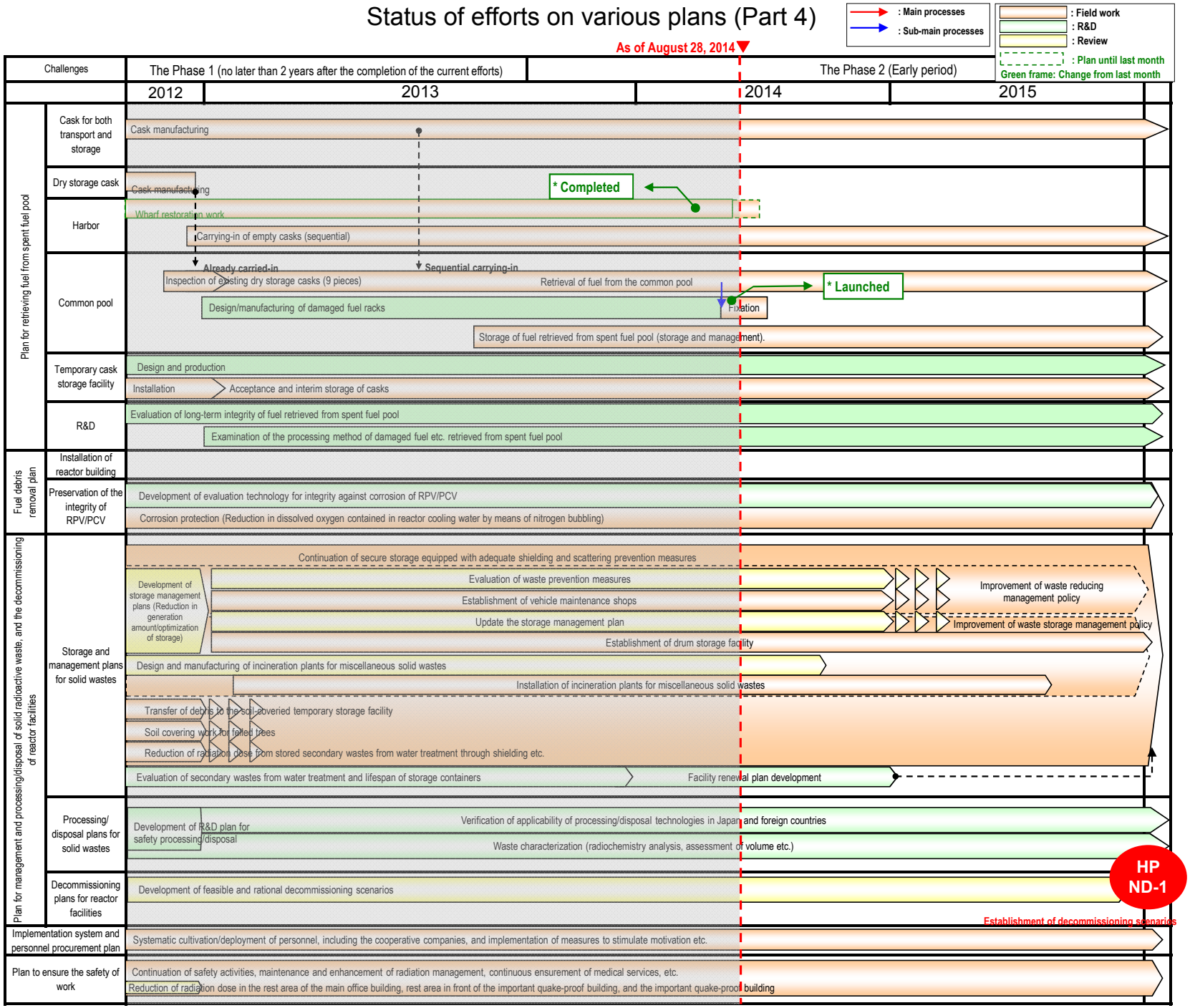
Status of efforts on various plans (Part 2)



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 Spent Fuel Pool (Unit 4, November 2013)

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.
As of June 30, 1,166 of 1,331 spent fuel assemblies and 22 of 202 new fuel assemblies have been transferred to the common pool, meaning 77% of the removal has been completed to date.

Though fuel removal has been suspended since July 1 due to annual inspection of the overhead cranes, it will resume from around September 4. There is no change in the scheduled removal completion within 2014.
Since the procurement of storage casks was partially prolonged, the common pool run out of space. The plan was changed to transferring new fuel assemblies (all remaining 180 fuel assemblies) in the Unit 4 spent fuel pool to Unit 6.


Fuel removal status

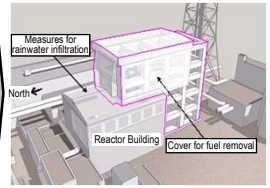

Loading the transportation container onto the trailer

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

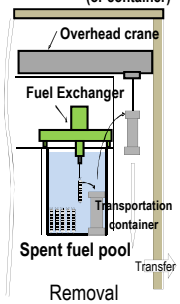
Work is proceeding with appropriate risk countermeasures, careful checks and safety first

Steps toward fuel removal


Removal of rubble from the roof of the Reactor Building
Completed in Dec. 2012



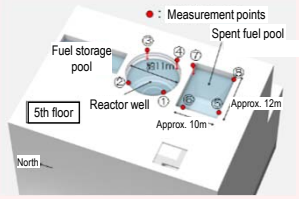
Installation of cover for fuel removal
From Apr. 2012, completed in Nov. 2013



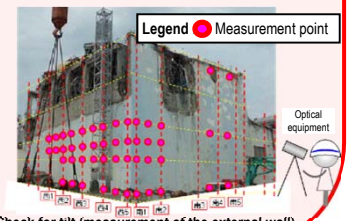
Removal
Commenced in Nov. 2013

Check of the soundness of the Reactor Building

Since May 2012, regular quarterly 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)

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

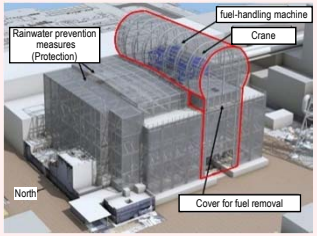


Image of the cover for fuel removal

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 is planned. Prior to dismantling, the ventilation system of the cover was suspended (September 17, 2013).
Dismantling will be launched once preparation is complete.
When the building cover is dismantled and the rubble is removed, sufficient measures to prevent radioactive materials from scattering will be taken and monitoring will be conducted.
● Regarding Unit 2, based on the progress of decontamination and shielding within the Reactor Building, the facilities will be inspected and a concrete plan examined and prepared.

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

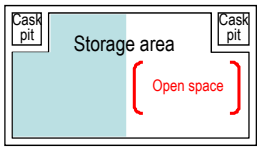

②Removing dust and dirt by suctioning devices


③Preventing dust from being stirred up via a windbreak sheet system by

④ Enhancing the dust-monitoring system by installing additional monitors

Measures to reduce release

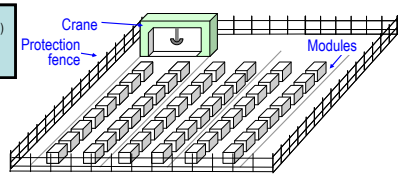
Common pool



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); 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

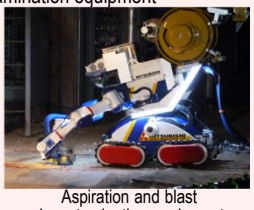
August 28, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

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

Demonstration of decontamination equipment

(1) Demonstration of suction and blast decontamination equipment

- Demonstration was conducted on the 1st floor of Unit 1 Reactor Building (from January 30 to February 4). The result showed that the β ray dose rate was reduced by removing dust through aspiration decontamination and the coated surface was shaved by the subsequent blast decontamination.



Aspiration and blast decontamination equipment

(2) Dry ice-blast decontamination equipment

- A demonstration was conducted on the 1st floor of the Unit 2 Reactor Building (from April 15-21).

Dry ice blast decontamination equipment

(3) High-pressure water decontamination equipment

- A demonstration was conducted on the 1st floor of Unit 1 Reactor Building (from April 23-29).

* Blast decontamination: A method to shave the surface by injecting polygonal steel grains into the object to be decontaminated (floor surface)

High-pressure water decontamination equipment

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 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

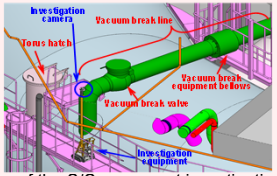
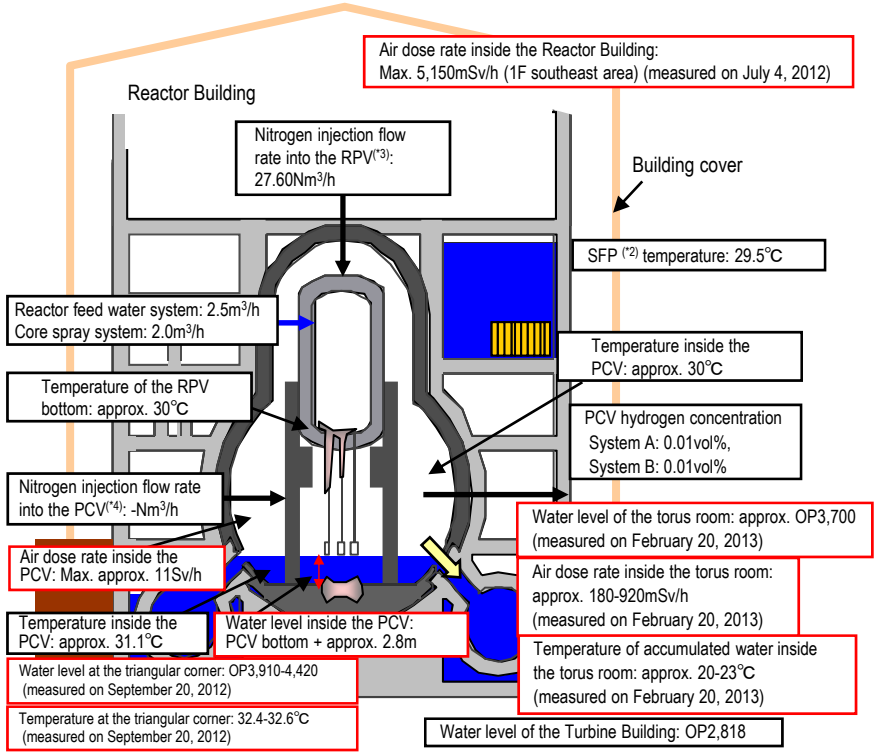


Image of the S/C upper part investigation

Unit 1



* Indices related to the plant are values as of 11:00, August 27, 2014

Status of equipment development toward investigating inside the PCV

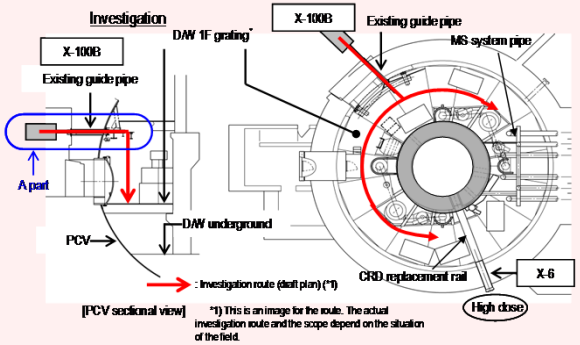
Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigation inside the PCV is scheduled. For Unit 1, where fuel debris may spread outside the pedestal, an investigation of the external side will commence.

[Investigative outline]

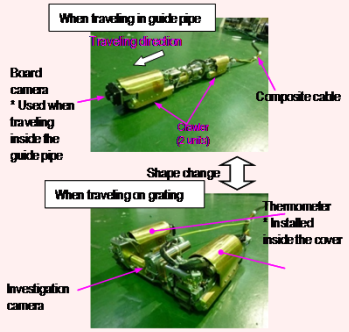
- Inserting equipment from Unit 1 X-100B penetration(*5) to investigate in clockwise and counter-clockwise directions.

[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: φ100mm) and stably move on the grating is currently under development. A field demonstration is scheduled for the 2nd half of FY2014.



Investigative route inside the PCV (draft plan)



<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

August 28, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment

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

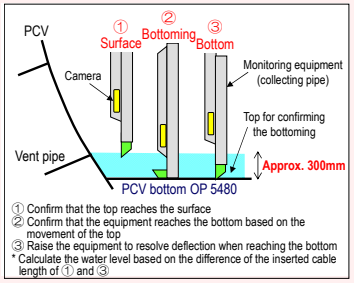
Installation of an RPV thermometer and permanent PCV supervisory instrumentation

(1) Replacement of the RPV thermometer

- As the thermometer installed at the Unit 2 RPV bottom after the earthquake had broken, it was excluded from the monitoring thermometers (February 19).
- On April 17, removal of the broken thermometer failed and was suspended. To facilitate removal, tests to check rust formation and fixing are underway (from May 12).

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

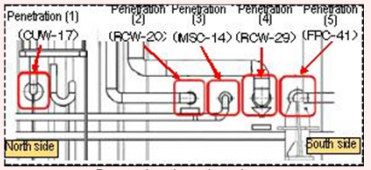
- Some of the permanent supervisory instrumentation for PCV could not be installed in the planned locations due to interference with existing grating (August 13, 2013).
- The instrumentation was removed on May 27, 2014 and new instruments were reinstalled on June 5 and 6. The trend of added instrumentation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



Method to measure water levels when re-installing monitoring instrumentation for Unit 2 PCV

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

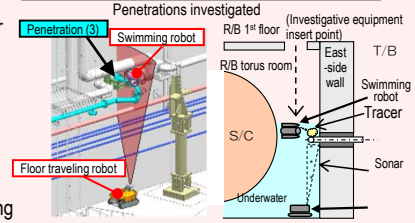
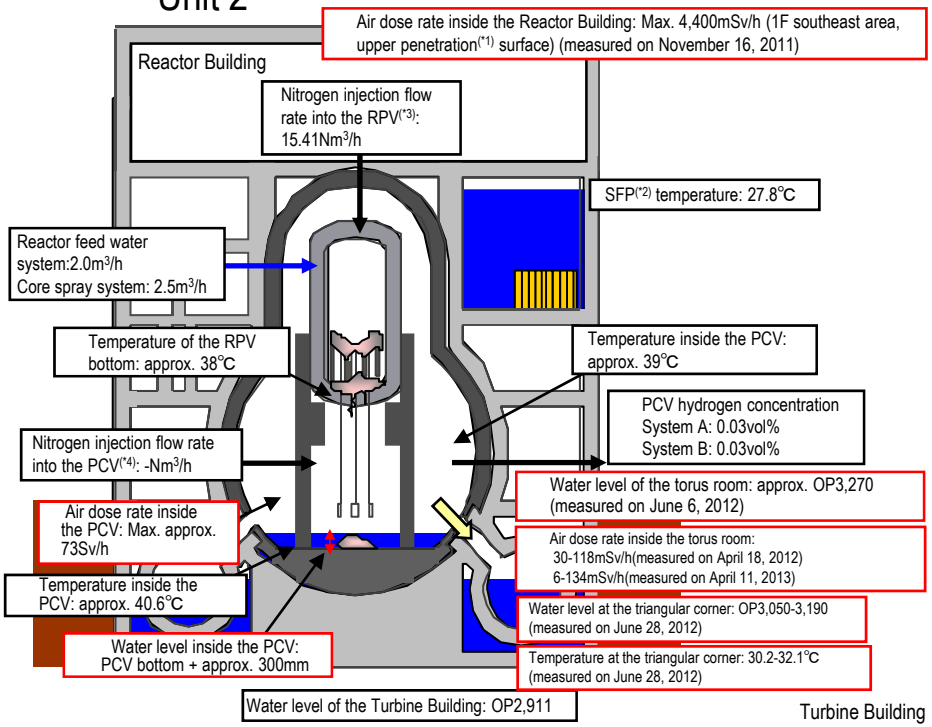


Image of the torus room east-side cross-sectional investigation

Unit 2



* Indices related to plant are values as of 11:00, August 27, 2014

Status of equipment development toward investigating inside the PCV

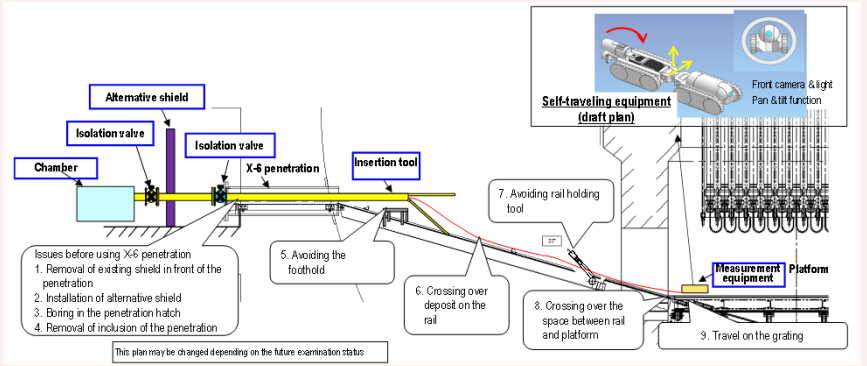
Prior to removing fuel debris, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigations inside the PCV are scheduled. For Unit 2, where fuel debris is unlikely to have spread outside the pedestal, the focus will be placed on investigating the inside.

[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 2nd half of FY2014.



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

August 28, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment
4/6

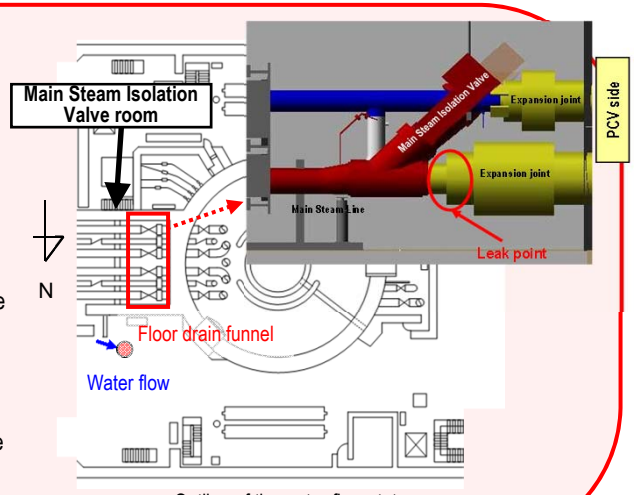
Immediate target	Identify the plant status and commence R&D and decontamination toward fuel debris removal

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

On January 18, 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, 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, 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

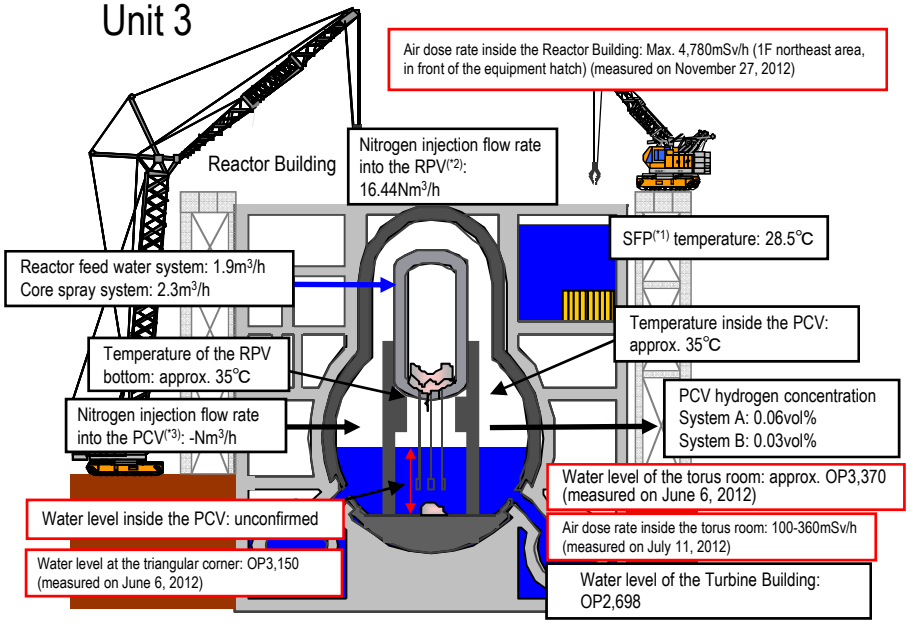
* Main Steam Isolation Valve: A valve to shut off the steam generated from the Reactor in an emergency

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, August 27, 2014

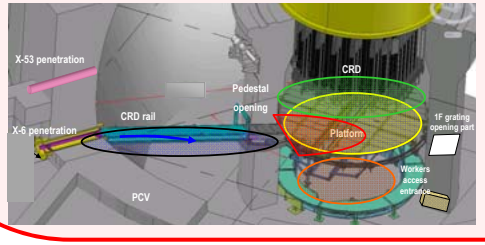
Status of equipment development toward investigating inside the PCV

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. For Unit 3, where there is little possibility of fuel debris spreading outside the pedestal, the focus will be placed on investigating the inside. As the water level inside the PCV is high and the penetration scheduled for use in Units 1 and 2 may decline in the water, another method needs to be examined.

[Steps for investigation and equipment development]

(1) Investigation from X-53 penetration
- Following decontamination, a field investigation is scheduled in the areas around X-53 penetration to determine the plan for conducting the inside investigation and equipment specifications.

(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)

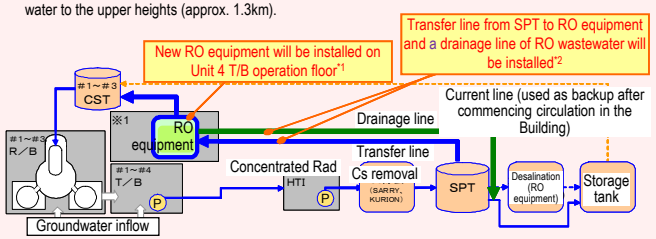
Progress toward decommissioning: Work related to circulation cooling and accumulated water treatment line

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

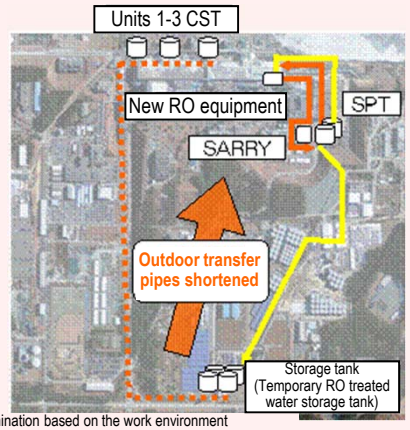
Work to improve the reliability of the circulation water injection cooling system and pipes to transfer accumulated water.

- 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 end of FY2014, 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



Measures in Tank Areas

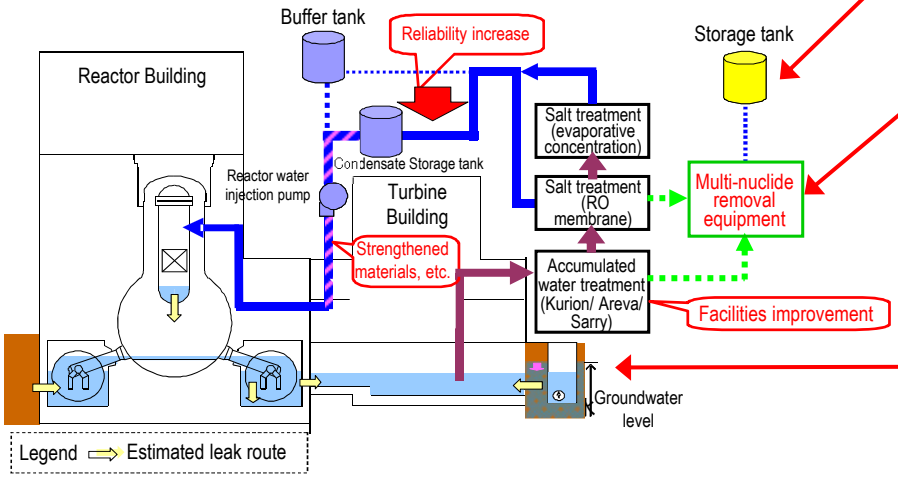
- To prevent contaminated water from flowing directly outside the port, even in case it leaks and flows into a release channel, the release channel route is steadily switched to inside the port. The release channel C route was switched from outside the port to inside it from July 14. The release route will be switched sequentially according to the results assessing the effect inside the port.

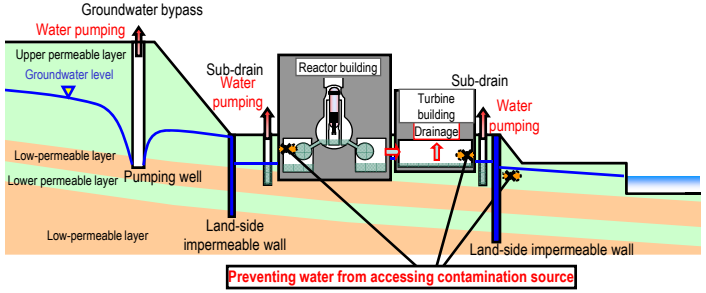

Water pipe installation status (1)


Water pipe installation status (2)

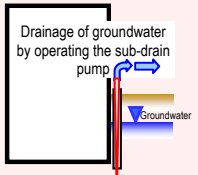
Installation status of additional and high-performance multi-nuclide removal equipment

- Regarding the additional multi-nuclide removal equipment, construction of a foundation steel frame (from June 12) and installation of equipment (from June 21) are underway. Installation of major System A equipment was completed and on August 27, the implementation plan was approved. From mid-September, hot tests will begin sequentially.
- Regarding the high-performance multi-nuclide removal equipment, foundation construction (from May 10) and installation of equipment (from July 14) are underway. Prior to the hot test beginning in October, a verification test to check the removal performance and replacement cycle of the high-performance absorbent is underway (from August 20).



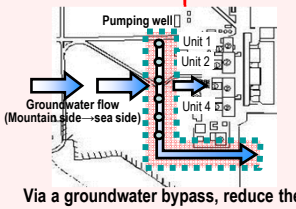


Preventing groundwater from flowing into the Reactor Buildings



To reduce groundwater level by sub-drain water pumping, treatment tests were conducted for some sub-drain pits of Units 1-4. The next stage will involve scheduled examination of the sub-drain recovery method.

Reducing groundwater inflow by pumping sub-drain water



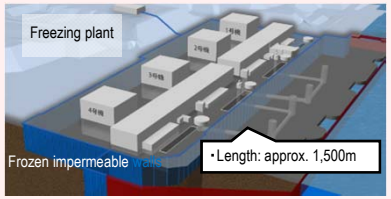
Measures to pump up groundwater flowing from the mountain side upstream of the Building to reduce the groundwater inflow (groundwater bypass) have been implemented.

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.

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 surrounding the buildings on the land side is planned.

Targeting efforts to commence freezing at the end of this fiscal year, drilling holes to install frozen pipes commenced from June 2.

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

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

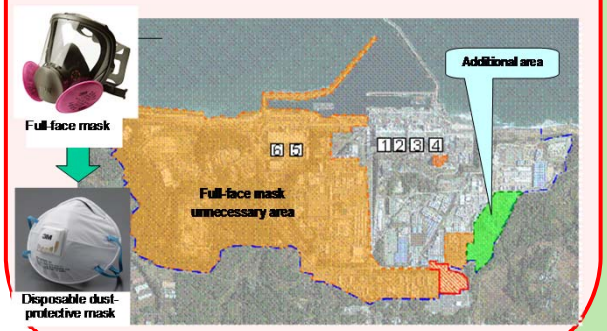
Progress toward decommissioning: Work to improve the environment within the site

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

Expansion of full-face mask unnecessary area

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), where for works not handling contaminated water, wearing disposable dust-protective masks will be deemed sufficient .



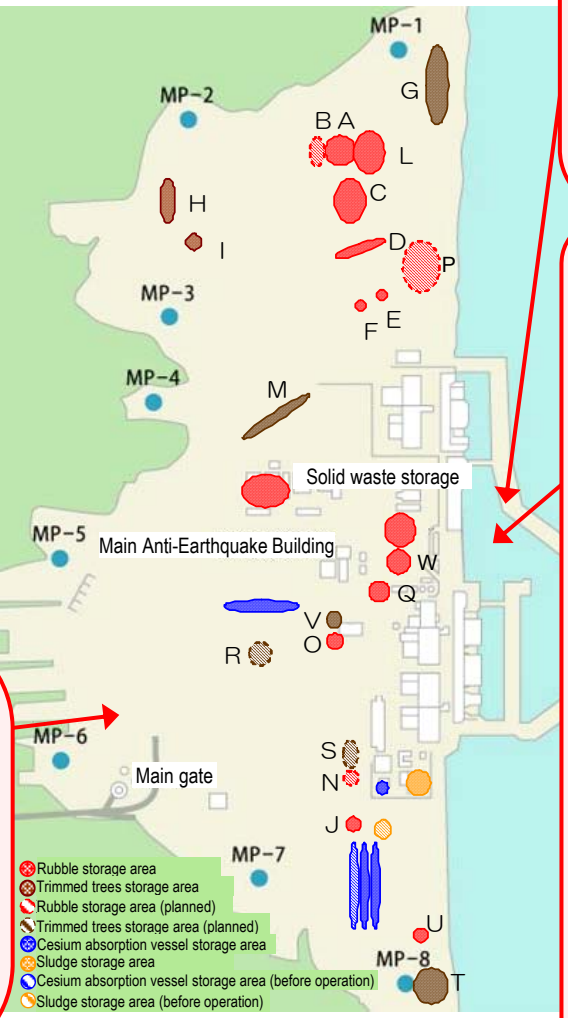
Full-face mask unnecessary area

Transfer to New Administrative Office Building near the field

To share information with the field and expedite the response to issues, a New Administrative Office Building is under construction on the site of Fukushima Daiichi Nuclear Power Station.

For the portion completed on June 30, approx. 400 staff members, including those of TEPCO's water treatment related sections who had worked at Fukushima Daini Nuclear Power Station, transferred and started work from July 22.

External and internal appearances of the New Administrative Office Building



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)

(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 14, 2013 – April 25, 2014, treatment of cesium and strontium.
  Freezing toward water stoppage commenced on April 2.
  Unit 3: November 15, 2013 – July 28, 2014, treatment of cesium.
  From early September, freezing toward water stoppage will commence