Progress Status and Future Challenges of the Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4 (Outline)

Progress status

◆The temperatures of the Reactor Pressure Vessel (RPV) bottom and the Primary Containment Vessel (PCV) gas phase of Units 1-3 have been maintained within the range of approx. 15-35°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.

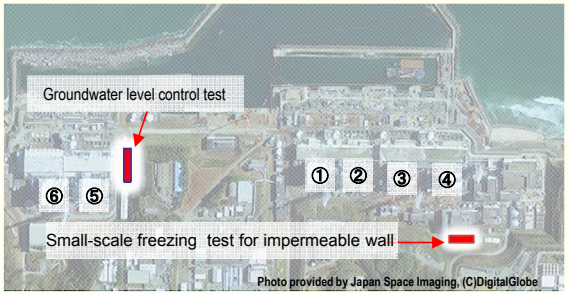
*2 The radiation exposure dose due to the current release of radioactive materials from the Reactor Buildings peaked at 0.03 mSv/year at the site boundaries. This is approx. 1/70 of the annual radiation dose by natural radiation (annual average in Japan: approx. 2.1 mSv/year).

◆ Fuel removal from the Unit 4 spent fuel pool commenced on November 18. As of March 26, 528 spent fuel assemblies and 22 non-irradiated fuel assemblies had been transferred to the common pool.

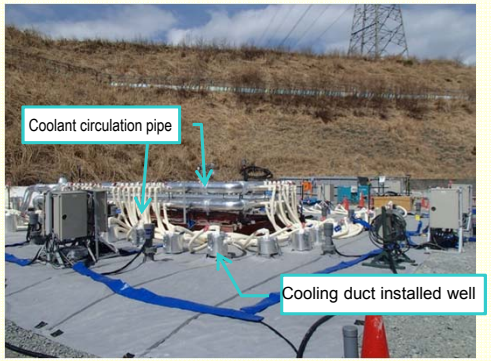
Small-scale freezing test for frozen impermeable walls began

A feasibility study has been conducted toward the installation of frozen impermeable walls surrounding Units 1 to 4.

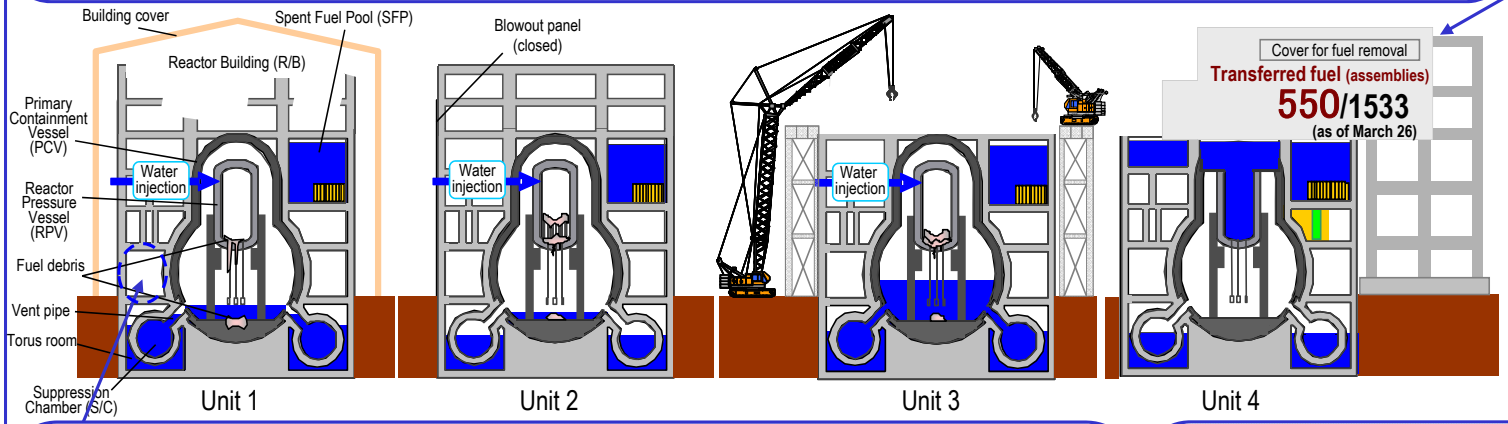
Small-scale freezing test has been in operation since March 14 following the installation of frozen ducts at the test site for impermeable walls.



<Location of small-scale impermeable wall test>



<Photo of field implementation status of freezing test>



Rubble removal operation accomplished in Unit 4 SFP

Rubble removal from the Unit 4 spent fuel pool (SFP), which has been operated in parallel with spent fuel removal, has been accomplished.
(Large rubble: accomplished on October 2, 2013, small rubble: accomplished on March 8, 2014)

Efforts are sustained toward completion of fuel removal by the end of 2014 .

Photo taken on March 12, 2014

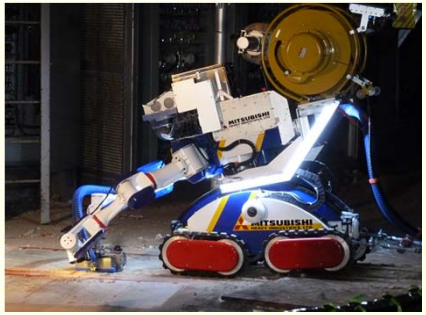
<Status inside Unit 4 SFP>

Demonstration of decontamination equipment at Unit 1

Demonstration test of the remote-control decontamination equipment was conducted on the 1st floor of the Unit 1 reactor building from January 30 to February 4. The equipment was developed for the fuel debris removal work in future with the subsidy project of the Ministry of Economy, Trade and Industry.

The result showed that the β ray dose rate was reduced by removing dust through vacuuming and the coated surface could be ground by the blast decontamination*.

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



<Vacuuming and blast decontamination equipment>

Increased radioactivity density of outlet water of multi-nuclide removal equipment System B

On March 18, as the radioactivity density of outlet water increased at multi-nuclide removal equipment System B (gross β: approx. 10^7Bq/L), all Systems were suspended.

It was estimated that the strontium which had traversed the filter remained in the absorption vessel and reached the outlet over an extended period.

From March 24, treatment to clean the transfer pipes was resumed using the healthy Systems A and C.*

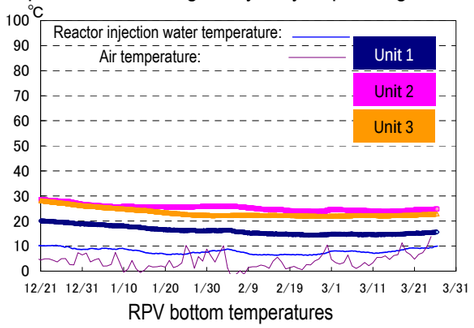
* To check for any leak from the manhole on the side of the destination tank, water was filled under monitoring. As water drops were detected by this check, System B was shifted to standby operation. On March 25, the System was resumed after replacing the packing at the relevant part.

* On March 27, As white turbidity was detected in the inlet water of the System A absorption vessel, the system was shifted to standby operation and investigation of the cause is underway.

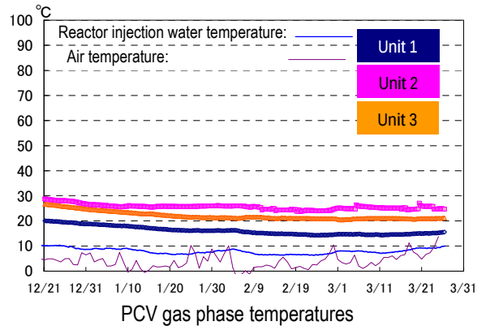
I. Confirmation of the reactor conditions

1. Temperatures inside the reactors

Through continuous reactor cooling by water injection, the temperatures of the Reactor Pressure Vessel (RPV) bottom and the Primary Containment Vessel (PCV) gas phase have been maintained within the range of approx. 15 to 35℃ for the past month, though they vary depending on the unit and location of the thermometer.



RPV bottom temperatures



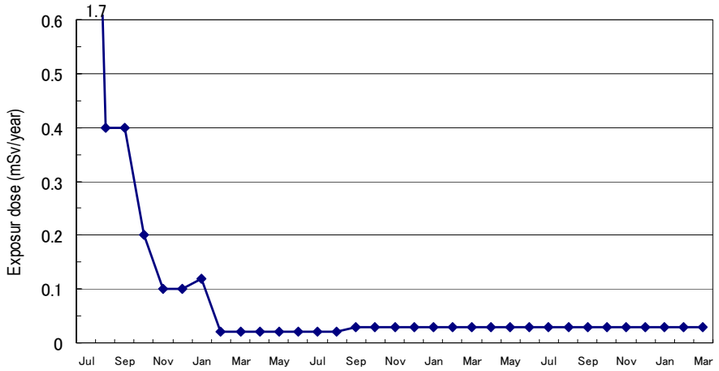
PCV gas phase temperatures

* 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 on-site boundaries was evaluated at approx. 1.4 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 value):
[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)

(Note) Different formulas and coefficients had been 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

➢ Replacement of the thermometer at the bottom of Unit 2 RPV

- As the thermometer installed at the bottom of Unit 2 RPV after the earthquake was broken, it was excluded from the monitoring thermometers (February 19). The temperature of the RPV bottom can be monitored by other thermometers. The broken thermometer will be removed (scheduled in April) and a new one will be installed (scheduled in May).

2. Accumulated water treatment plan

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

➢ Preventing groundwater inflow to the Reactor Buildings

- At the groundwater bypass pumping well Nos. 5 to 12, gross β and tritium densities are continuously measured. No major variation was detected.
- Toward the installation of the sub-drain facility (by the end of September), drilling in eight of 13 new pits completed as of March 26. For building the sub-drain treatment facility, the base concrete placement was made since February 27 and steel frames were constructed since March 12. Installation of equipment began from March 19.
- Toward the installation of frozen impermeable walls surrounding Units 1 to 4 (a project subsidized by the Ministry of Economy, Trade and Industry), a feasibility study was conducted on site. The freezing test began at the small-scale freezing test site for frozen impermeable walls (approx. 10m square) on March 14.

➢ Operation of the multi-nuclide removal equipment

- Hot tests using radioactive water are in operation (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013). To date, approx. 67,000 m^3 has been treated (as of March 25, including approx. 8,000m^3 at System B outlet, in which the radioactive material density is high).
- Regarding System A, though the pump for transfer to the absorption vessel was suspended (February 26), the treatment was resumed by replacing the inverter (February 27). System A continued operation except for the suspension period for filter cleaning (from February 28 to March 2) and in response to the increase in radioactive material density in System B outlet water (from March 18-24). However, as white turbidity was detected in inlet water of System A absorption vessel, the system was shifted to standby operation and investigation of the cause is underway (March 27). Since January 24, in response to the detection of four radioactive nuclides (except tritium) such as iodine 129 in the treated water, measures to improve performance with actual equipment using activated carbon adsorbent have been implemented.
- Regarding System B, the pump for transfer to the absorption vessel was suspended (March 5). As the estimated cause was continuous operation at a low flow rate due to a defect of the filter, the treatment was resumed from March 6. Following the inspection of filters (from March 6-13), the operation was resumed. On March 18, as the radioactive material density in the outlet water increased at multi-nuclide removal equipment System B (gross β: approx. 10^{7}Bq/L), all systems were suspended. The estimated cause was that the carbonate, including a high level of strontium which had traversed the filter due to a defect in the same, remained in the absorption vessel and, over an extended period, reached the outlet.
- Though System C was suspended in response to the increase in radioactive material density in System B outlet water (from March 18-24), the treatment resumed from March 24.
- From March 24, treatment operation of Systems A and C was resumed to clean transfer pipes contaminated by high-density water at System B outlet. To check for any leak from the manhole on the side of the sample tank storing outlet water, water was filled under monitoring. As water drops were detected from the relevant part, System B was shifted to standby operation. On March 25, the System was resumed after replacing the flange packing at the manhole.
- Toward the installation of additional multi-nuclide removal equipment, removal of obstacles, drilling, ground improvement, and foundation construction are in operation.
- Toward the installation of high-performance multi-nuclide removal equipment, work to remove obstacles, drill, improve the ground improvement, and construct foundations is underway. An implementation plan was submitted for application on March 7.

➢ Measures in the Tank Area

- Examination on the applicability of ground improvement using material (apatite) that collects strontium in the soil is underway. As the effectiveness of collection could not be verified in the indoor test, it is under consideration to review the material and firing conditions of apatite.

➢ Treatment and removal of contaminated water from the Main Trenches

- As for the Main Trench Units 2 and 3, treatment of contaminated water using the mobile treatment equipment is underway (Unit 2: from November 14, Unit 3: from November 15). In both Units 2 and 3, a reduction in radioactive cesium density was confirmed. Removal of strontium will also begin (Unit 2: scheduled for commencement from early April, Unit 3: from mid-April). On March 25, the leak detector of Unit 3 treatment equipment issued an alarm and the equipment was automatically suspended. It was confirmed that the leak water did not spread outside the fences and the leak was stopped. The estimated cause was a leak from the valve sheet of the absorption vessel air vent line.

- Toward the removal of contaminated water from June 2014, water stoppage by freezing between the trench and Reactor Building is scheduled. Drilling of holes is underway to install frozen ducts and pipes for temperature measurement (Unit 2: commenced in December 2013 and scheduled for completion by end May 2014 (completed 22/48 ducts (as of March 24)), Unit 3: scheduled for from April to June 2014).

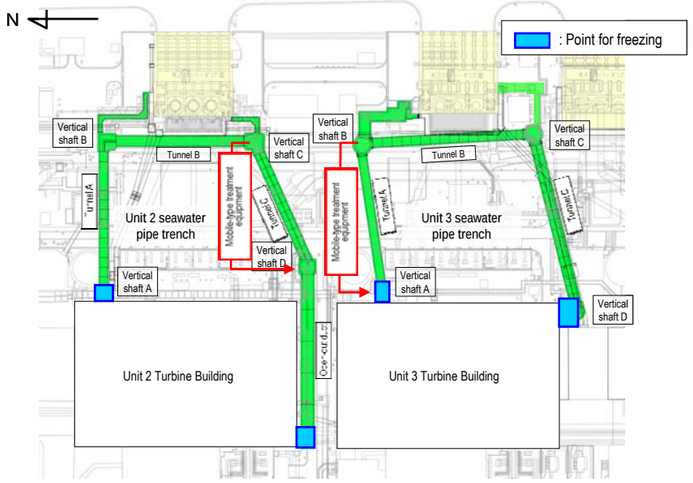


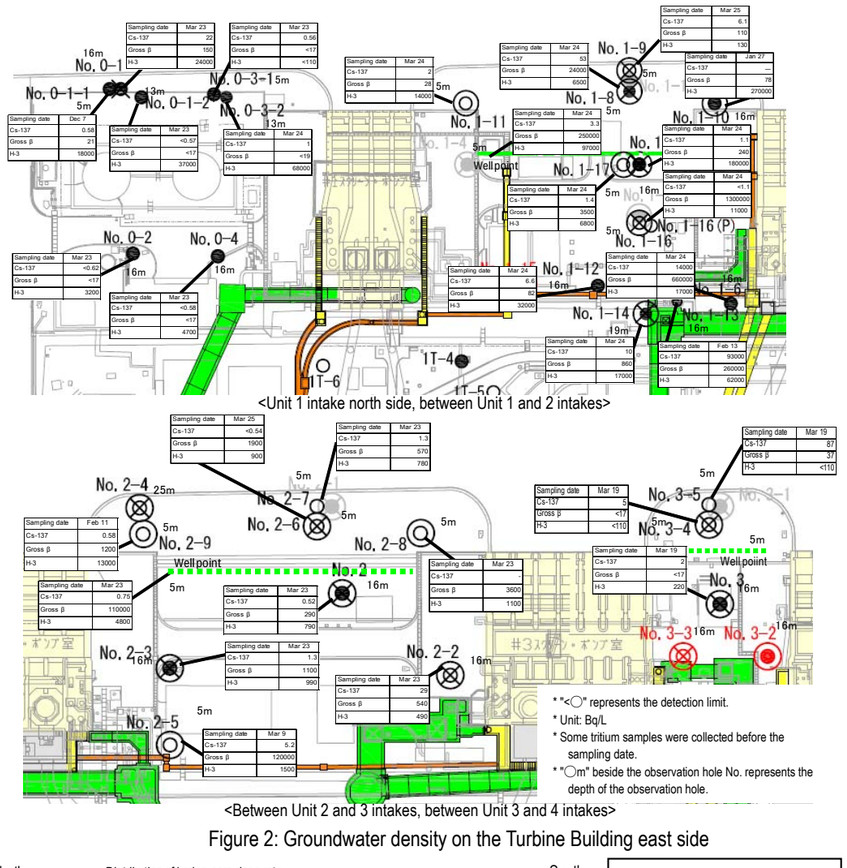
Figure 1: Image of contaminated water treatment and frozen water stoppage of main trench

3. Plan to reduce radiation dose and mitigate contamination

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

➢ Status of groundwater and seawater on the east side of Units 1 to 4 Turbine Buildings

- Regarding the groundwater near the bank on the north side of the Unit 1 intake, the densities of cesium and the gross β radioactive materials have been maintained at 10^1 and 10^2Bq/L, respectively. The density of tritium has been decreased since March at Observation Hole Nos. 0-1-2, 0-2 and 0-4, while the density of tritium on the bank is also decreasing. The tritium density in seawater on the North side of Units 1-4 intakes was also decreasing. From Observation Hole No. 0-3-2, pumping of 1 m^3/day of water continues.
- Regarding the groundwater near the bank between the Unit 1 and 2 intakes, both densities of tritium and gross β radioactive materials in water pumped from the well point are high at 10^5Bq/L. At the groundwater Observation Hole No. 1-16, the gross β radioactive material density has been maintained at around 10^6 Bq/L since March 3. At the groundwater Observation Hole Nos. 1-6 and 1-13 near the power supply cable trench, both densities of gross β radioactive materials and cesium 137 are high at 10^5Bq/L. Analysis of the boring core identified a high radiation dose near the power supply cable conduit line and in the soil under it (see Figure 3). Water pumping from the well point (approx. 30-40 m^3/day) and the pumping well No. 1-16 (P) (1m^3/day) installed near the Observation Hole No. 1-16 continue.
- Regarding the groundwater near the bank between Units 2 and 3 intakes, the gross β radioactive material density is high (10^5Bq/L) on the north (Unit 2) side. To check the contamination status on the south side, water sampling from the new groundwater Observation Hole No. 2-8 installed on the southeast side began (from February 26) and it was confirmed that the density was at the same level as at the groundwater Observation Hole No. 2-6 (gross β: 10^3Bq/L, tritium: 10^3Bq/L). Water pumping from the north side of the well point continues (4m^3/day).
- Regarding the groundwater near the bank between the Unit 3 and 4 intakes, the density of radioactive materials is maintained at low levels at all Observation Holes.
- Within the port, no significant change in the radioactive material density of seawater was detected in recent data for the past month, nor any significant increase in offshore measurement results, as was the case a month ago.
- In response to the progress of the construction of impermeable walls on the sea side, placement of concrete in water and landfill are underway inside the impermeable walls from the north side (see Figure 4). In conjunction with these works, removal and installation of silt fences, abolition of sampling points inside the impermeable walls (“North side of Units 1 to 4 intakes” and “Unit 1 intake” and set up of a new sampling point inside the impermeable walls (“South side inside Units 1 to 4 intakes (in front of impermeable walls)”) were conducted.



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

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

Figure 2: Groundwater density on the Turbine Building east side

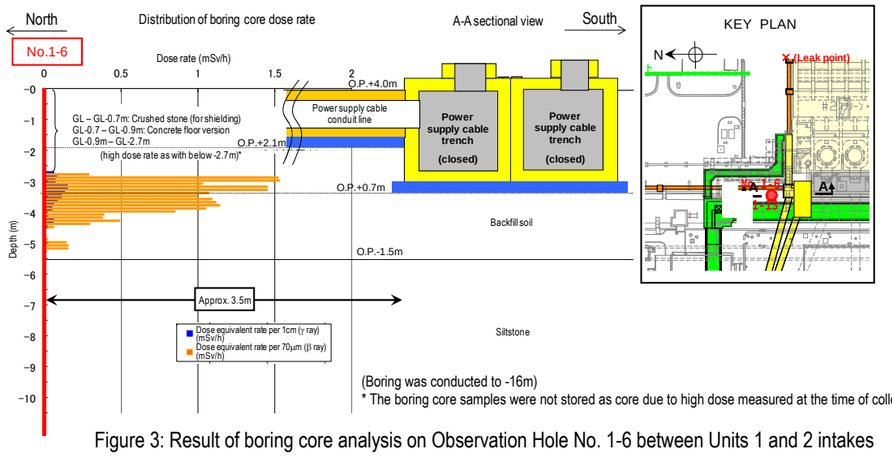


Figure 3: Result of boring core analysis on Observation Hole No. 1-6 between Units 1 and 2 intakes

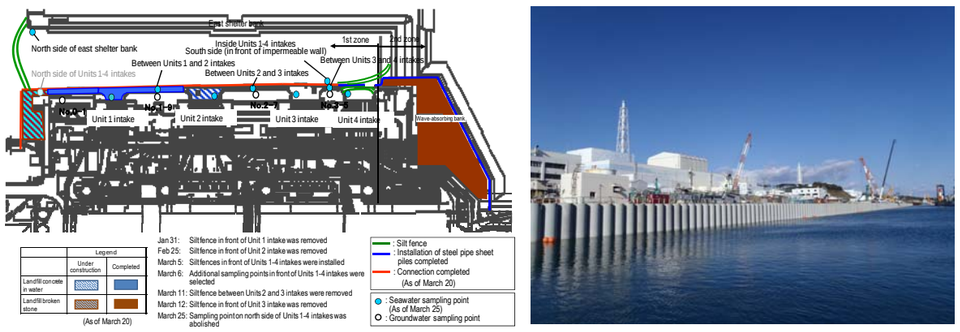


Figure 4: Progress status of impermeable walls on the sea side

4. Plan to remove fuel from the spent fuel pools

Work toward removing spent fuel from the pool is steadily progressing 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.
- As of the end of work on March 26, 528 of 1331 spent fuel assemblies and 22 of 202 non-irradiated fuel assemblies had been transferred to the common pool.
- On March 26 during preparatory work to remove the fuel from Unit 4, the failure lamp of the overhead crane in the Reactor Building lit up and the crane failed to work. At present the operation is suspended and the cause investigation is underway.
- Removal of rubble from inside of the pool, which was conducted in conjunction with fuel removal, completed (from August 27, 2013 to March 8, 2014).
- To reduce the radiation dose during the fuel removal work, a cover for fuel removal on the north (Unit 3) side and shields for the fuel-handling equipment are being installed (completed on by March 25). The next step will involve scheduled verification of the effects and the additional installation of a shield.

➢ Check of the health of the Unit 4 Reactor Building

- To check the health of the Reactor Building and the spent fuel pool, the 8th periodical inspection was conducted with the presence of external experts in the field (from March 11-27).

➢ Main works toward removing spent fuel at Unit 3

- The removal of rubble such as steel, deck plates, and roof torus is conducted (from December 17). As of March 25, a total of 322 steel pieces, 55 deck plates and 3 roof torus materials were removed. The next step will involve the scheduled removal of masts and fuel exchangers.
- Measures to reduce the radiation dose (decontamination and shielding) on the Reactor Building 5th floor (operating floor) are underway (commenced on October 15, 2013). At present, decontamination is underway using self-traveling and fixed-type decontamination equipment.

➢ Structure investigation of Unit 1 Reactor Building (3rd and 4th floors)

- To reflect the result in the seismic safety assessment prior to designing and selecting the cover and container for fuel removal, the 3rd and 4th floors of the Reactor Building were investigated (February 26). Though damage was detected in some parts, no damage was detected in the major aseismic structure (shell walls, pool walls and external walls).

5. Fuel debris removal plan

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

➢ Contamination status survey and decontamination of Reactor Building Units 1 to 3

- On the 1st floor of the Unit 1 Reactor Building, the aspiration demonstration and blast decontamination equipment developed in the subsidy project of the Resource and Energy Agency “Development of remote decontamination technology inside the Reactor Building” was conducted (from January 30 to February 4). Regarding β rays, to which the floor surface, a decontamination target, dominantly contributes, the result showed that the dose rate was reduced nearly to the detection limit by aspiration decontamination. It was also confirmed that through the following blast decontamination, the coated surface was shaved and the dose rate was reduced to the detection limit.
- To ensure the operation route of the robot for collecting floor and wall concrete core on the Unit 2 Reactor Building 5th floor (operating floor), fences on the operation floor were removed using the remote control robot (March 13 and 14). As the robot fell during the operation and the battery became low, the relevant robot could not be collected. Removal of fences was completed and the core was collected within the accessible range (from March 20-26).

6. Plan to store, process and dispose of solid waste and decommission reactor facilities

Promoting efforts to reduce and appropriately store waste generated and R&D toward adequate and safe storage, processing and disposal of radioactive waste

➢ Status of management of rubble and trimmed trees

- As of the end of February the total storage volume of concrete and metal rubble was approx. 81,100 m^3 (+11,200m^3 compared to at the end of January) the area occupation rate: 61%). The total storage volume of trimmed trees was approx. 77,600 m^3 (±0m^3 compared to at the end of January) (area occupation rate: 60%). From February, the rubble storage area was expanded. The increase in metal rubble is mainly attributable to removal of scrapped vehicles to install tanks and construction of a large rest house.

➢ Status of management of secondary waste from water treatment

- As of March 25, the total storage volume of waste sludge was 597 m^3 (area occupation rate: 85%). The total storage number of spent vessels and storage containers of multi-nuclide removable equipment (HIC) was 844 (area occupation rate: 34%).

➢ Assessment on long-term storage of secondary waste from water treatment

- Assessment on long-term storage of spent absorption vessels from the cesium absorption equipment (KURION) and waste sludge from the decontamination equipment (AREVA) was conducted as a project entrusted by the Ministry of Economy, Trade and Industry.
- Regarding cesium absorption vessels, the result showed that the hydrogen concentration was maintained below the explosion limit (4%) during long-term storage, and the risk of localized corrosion by radiation was reduced if zeolite was placed together.
- Regarding the temporary waste sludge storage, the result showed that during long-term storage, generation of hydrogen cyanide, a toxic substance, was below the detection limit (< 5ppm), and the risk of leak from penetration due to corrosion was low.

7. Plan for staffing and ensuring work safety

Securing appropriate staff for the 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 number of people registered for at least one day per month to work on site during the past quarter from November to January was approx. 9,000 (TEPCO and partner company workers), which exceeds the monthly average number of workers (approx. 6,700). Accordingly, sufficient people are registered to work on site.
- It was confirmed that the estimated manpower necessary for the work in April (approx. 4,200 per day: TEPCO and partner company workers)* would be secured. The average numbers of workers per day for each month of this fiscal year (actual value) have been maintained with approx. 3,000 to 4,000 per month since August (See Figure 5)

  * Workers with whom contract procedures have not yet been completed are excluded from the total for each month.
- As of February, the local employment ratio (TEPCO and partner company workers) was approx. 50%.

➢ Efforts to improve the labor environment

- A temporary rest house (three-story, capacity: approximately 1,000 workers) is currently under construction outside the site (scheduled to begin operation in early April).

➢ Outbreak status of influenza and norovirus

- As of March 14, 176 persons were infected with influenza and 30 persons, with norovirus. Thorough infection-control measures will be continued. (Accumulated totals last year were 204 for influenza and 37 for norovirus patients).

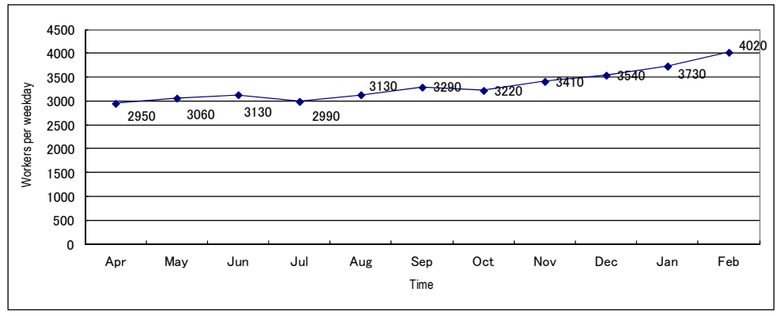


Figure 5: Changes in the average number of workers per day for each month in fiscal 2013 (actual values)

8. Others

➢ Progress status of emergency safety measures of Fukushima Daiichi Nuclear Power Station

- Based on the findings suggested by the Nuclear Regulatory Commissioner, TEPCO reported to the Commissioner the progress status of the emergency safety measures formulated in November 2013 (March 20). These emergency safety measures will also be promoted strongly at the Fukushima Daiichi Decommissioning Promotion Company which will be launched in April 2014.

➢ Achievement in FY2013 and plan for FY2014 for R&D

- For each R&D project, progress and achievements in FY2013 to date and proposed plans for FY2014 were collected, based on which FY2014 projects will be launched accordingly.

Appendix 1

March 27, 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
- High-level contaminated water
- 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)

Spent cesium absorption vessel temporary storage

Temporary waste sludge storage

Tank installation status

Futaba town

Ohkuma town

Unit 6

Unit 5

Unit 1

Unit 2

Unit 3

Unit 4

Rubble

Trimmed trees

Miscellaneous Solid Waste Volume Reduction Treatment Building (planned)

Temporary trimmed trees storage pool

Frozen soil impermeable wall demonstration test

Town boundary

Mega float

Chiller for reactor water injection facility

Main Anti-Earthquake Building

Treatment facility for sub-drain water

Dry cask temporary storage facility

Multi-nuclide removal

High-performance multi-nuclide removal equipment (planned)

Additional multi-nuclide removal equipment (planned)

Spent cesium absorption vessel temporary storage

Pumping pipe route

Underground reservoirs

Vehicles maintenance site (planned)

Vehicle screening and decontamination site

Temporary Administration Office Building (planned)

Groundwater bypass temporary storage tank

Administration Office Building (planned)

Temporary rest house outside the site (planned)

Large rest house (planned)

Access control facility

Common pool

2nd cesium absorption apparatus (HTI Building)

Water desalinations (evaporative concentration)

Water desalinations (RO)

Sea side impermeable wall (under construction)

Cesium absorption apparatus (Incineration Workshop Building)

Decontamination instruments (Process Building)

Cesium absorption vessel temporary storage

Water discharge pipe route

Temporary waste sludge storage

High-level accumulated water reception tank (emergency reception)

Mid-/ low-level fresh water tank

Spent cesium absorption vessel temporary storage

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

Site boundary

MP-1 MP-2 MP-3 MP-4 MP-5 MP-6 MP-7 MP-8

H1 H2 H3 H4 H5 H6 H8 H9 D E F G G3・G4・G5 G6 B C J

Provided by Japan Space Imaging Corporation, (C)DigitalGlobe

0m 100m 500m 1000m

Status of efforts on various plans (Part 1)

Attachment 2

: Main processes
: Sub-main processes
: Field work
: R&D
: Review
:Plan until last month
Green frame: Change from last month

As of March 27, 2014

Challenges	Phase 1 (no later than 2 years after the completion of the current efforts)		Phase 2 (Early period)	
	2012	2013	2014	2015

Reactor cooling plan

- Maintenance and monitoring of the cold shut down condition of nuclear reactor (by continuous monitoring on the continuation of water injection and parameters including temperature etc. , preservation and improvement of reliability through maintenance and management)
- Narrowing-down of candidate systems for inserting alternative thermometer in Unit 1 RPV
- Review on the method for inserting alternative thermometer in Unit 1 RPV*
  *The time for executing the installation work will be determined after on-site studies etc., on the basis of the status of environmental improvement by means of decontamination/shielding.
- Installation of thermometer in Unit 2 RPV (including inspection in nuclear reactors)
- Narrowing-down of candidate systems for inserting alternative thermometer in Unit 3 RPV
- Review on the method for inserting alternative thermometer in Unit 3 RPV*
- Partial observation d * Selected
- Remote visual check of the PCV, direct measurement/evaluation of temperature etc.
- ▽Objective: Completion of switching to the equipment for water intake from the reactor building (or from the bottom 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)
- Water source: Treated water buffer tank
- Water source: Condensate water storage tank for Units 1 to 3
- The circulating injection cooling system (water intake from the reactor building (or the lower part of the reactor containment vessel))
- Reliability improvement measures for the lines taking water supplies from the condensate water storage tanks of Units 1 to 3
- Review on water take from reactor building (or from the bottom of the PCV) - Construction work
- Switching among the water intake equipment (sequential)
- Inspection/review for early construction of the circulation loop in the building
- Construction of circulation loop in the building (for Units 1 to 3)

Plan for retrieving fuel from spent fuel pool

Unit 1

- Review on fuel removing method
- HP 1-1
- Selection of a fuel/fuel debris removing plan
- Dismantling of building cover
- Removal of debris, decontamination and shielding
- Modification/recovery of building cover
- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

Unit 2

- Consideration/preparation for the decontamination and shielding in the building
- HP 2-1
- Selection of a fuel/fuel debris removing plan
- Decontamination/shielding, restoration of fuel handling equipment
- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

Unit 3

- Preparatory work/debris removing work
- Removal of debris, decontamination and shielding in the
- HP 3-1
- Selection of a fuel/fuel debris removing plan
- Construction of fuel removal cover/installation of fuel handling equipment
- Removal of debris In the pool/fuel check
- Design and manufacturing of fuel removal cover
- Design and manufacturing of crane/fuel handling machines
- Consideration, design and manufacturing of on-site shipping containers
- Fuel removal
- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

Unit 4

- Construction of fuel removal cover/installation of fuel handling equipment
- * Completed
- Removal of debris In the pool/fuel check etc.
- Fuel removal
- Pool circulation cooling (preservation/improvement of reliability by maintenance management and facility update etc.)

Status of efforts on various plans (Part 2)

: Main processes
: Sub-main processes
: Field work
: R&D
: Review
:Plan until last month
Green frame: Change from last month

As of March 27, 2014

Challenges	Phase 1 (no later than 2 years after the completion of the current efforts)	Phase 2 (Early period)
	2012	2013	2014	2015

Fuel debris removal plan

Decontamination of the inside of the building
- Review on decontamination technology/development of remote decontamination equipment
- Development of remote contamination investigation technologies (1)
- Development of remote decontamination technologies (1)
- Site survey and on-site demonstration
- ▽Objective: Establish decontamination robot technology
- * Reviewed based on the actual situation
- Decontamination, shielding, etc. in the building (Work environment improvement (1))
- First floor of the reactor building
- To be continued

Measures to reduce overall dose
- Formulation of a comprehensive plan for exposure reduction
- Grasping of the situation of work area
- Formulation of work plan in the reactor building
- Formulation of work plan on the floor with damage from explosion
- * Reviewed based on the progress status in the field

Inspection/repair of leaking locations of the PCV
- R&D for inspection/repair of leaking locations of the PCV (including stop leakage between buildings).
- * Reviewed based on the actual situation
- Design, manufacturing and testing etc. of the equipment for inspecting the PCV (2)
- Design, manufacturing and testing etc. of the equipment for inspecting the PCV (3), (6)
- [Units 1 and 3] Inspection of the basement of the nuclear reactor building, Inspection of leaking locations☆
- ☆: Including on-site demonstration
- [Unit 2] Inspection of the basement of the nuclear reactor building, Inspection of leaking locations☆

Fuel debris removal
- R&D toward the removal of fuel debris (to be continued to address long-term challenges including internal R&D of equipment etc.)
- Design, manufacturing and testing etc. of the equipment for inspecting the inside of the PCV (5)
- Inspection from outside the PCV (including on-site demonstration of development results)

Stable storage, processing/disposal of fuel debris after removal
- Development of storage cans (surveys on existing technologies, review on storage systems/development of safety evaluation technique etc.)
- Research on/development of mock-up processing/disposal technologies
- Establishment of nuclear material accountancy and control measures for the fuel debris

Others
- Development of criticality evaluation and detection technologies

Status of efforts on various plans (Part 3)

: Main processes
: Sub-main processes
: Field work
: R&D
: Review
:Plan until last month
Green frame: Change from last month

▼As of March 27, 2014

Challenges	The Phase 1 (no later than 2 years after the completion of the current efforts)		The Phase 2 (Early period)	
	2012	2013	2014	2015

Plan for maintaining and continuing the steady state of plant

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. (improve the reliability of transfer, processing, and storage facilities).
- * Completed
- Treatment of retained water by water treatment facilities with improved reliability
- Replacement of branch pipe pressure hoses with PE pipes
- Measures to prevent the expansion of tank leakage (Reinforced concrete dam/embankment/replacement by closed conduits), to be taken sequentially along with the installation of tanks
- Consideration of reducing the circular lines
- * Reviewed based on the progress status in the field
- Review on sub-drain recovery methods
- Sub-drain restoration work
- Restore sub-drain facilities, reduce the amount of groundwater inflow (reduction in retained water)
- Review on sub-drain and other purification facility → Installation work
- Drawdown of groundwater in the building
- Groundwater bypass installation work
- Groundwater inflow is reduced (Retained water is decreased).
- Installation of multi-nuclide removal equipment
- Consider and implement measures to increase the processing amount
- Purification of on-site reservoir water
- Preparation work for frozen soil impermeable walls
- Installation work
- Reduce groundwater inflow rate

Plans toward the reduction in the radiation dose and prevention of the spread of contamination in the entire power plant

Plan for preventing the spread of marine pollution

- Construction of sea side water barrier wall
- Landfilling etc. in the harbor area
- ▽ Objective: Reduction of the risk of spreading marine contamination during the leakage of contaminated water
- Installation of steel pipe sheet pile
- ▽Objective: Reduction of the concentration of radioactive substances contained in the seawater of the harbor (to less than the notified concentration)
- Consideration of technologies for decontaminating radioactive strontium (Sr)
- Seawater circulation purification
- Sea water purification by fibrous adsorbent material (ongoing)
- Decontamination of Radioactive strontium (Sr)
- Covering etc. of dredge soil over sea routes and berths
- Monitoring of ground water and seawater (implemented on an ongoing basis)

Gas/liquid waste

- Operation of the gas management system of Units 1 to 3 PCVs
- Installation of ventilation equipment/closure of the opening of blow-out panel for Unit 2
- Measurement of dust concentration at the opening of buildings etc., on-site survey
- * Completed
- Improve the accuracy of gas monitoring
- Land and marine environmental monitoring (implemented in an ongoing basis)

Reduction in radiation dose at the site boundary

▽Objective: Control the radiation dose at the site boundaries caused by radioactive substance etc. additionally released from the entire power plant at 1mSv/year or less

- Reduction of radiation dose by shielding, etc.
- Reduction of radiation dose by the purification of contaminated water etc.
- Land and marine environmental monitoring (implemented in an ongoing basis)

Site decontamination plan

- Systematic implementation of decontamination in the site of power generation plant (Decontamination is implemented in stages beginning with the areas where workers frequently enter and exit in parallel with the reduction in off-site radiation dose)
- The first step (work area: 10 to 5μSv /h Main roads: 30 to 20μSv /h)

Status of efforts on various plans (Part 4)

: Main processes
: Sub-main processes
: Field work
: R&D
: Review
:Plan until last month
Green frame: Change from last month

As of March 27, 2014

Challenges	The Phase 1 (no later than 2 years after the completion of the current efforts)		The Phase 2 (Early period)	
	2012	2013	2014	2015

Plan for retrieving fuel from spent fuel pool

- **Cask for both transport and storage**: Cask manufacturing
- **Dry storage cask**: Cask manufacturing
- **Harbor**: Wharf restoration work; Carrying-in of empty casks (sequential)
- **Common pool**: Already carried-in; Sequential carrying-in; Inspection of existing dry storage casks (9 pieces); Retrieval of fuel from the common pool; Design/manufacturing of damaged fuel racks; Fixation; Storage of fuel retrieved from spent fuel pool (storage and management).
- **Temporary cask storage facility**: Design and production; Installation; Acceptance and interim storage of casks
- **R&D**: Evaluation of long-term integrity of fuel retrieved from spent fuel pool; Examination of the processing method of damaged fuel etc. retrieved from spent fuel pool

Fuel debris removal plan

- **Installation of reactor building**
- **Preservation of the integrity of RPV/PCV**: Development of evaluation technology for integrity against corrosion of RPV/PCV; Corrosion protection (Reduction in dissolved oxygen contained in reactor cooling water by means of nitrogen bubbling)

Plan for management and processing/disposal of solid radioactive waste, and the decommissioning of reactor facilities

- **Storage and management plans for solid wastes**: Continuation of secure storage equipped with adequate shielding and scattering prevention measures; Development of storage management plans (Reduction in generation amount/optimization of storage); Evaluation of waste prevention measures; Establishment of vehicle maintenance shops; Update the storage management plan; Improvement of waste reducing management policy; Improvement of waste storage management policy; Establishment of drum storage facility; Design and manufacturing of incineration plants for miscellaneous solid wastes; Installation of incineration plants for miscellaneous solid wastes; Transfer of debris to the soil-covered temporary storage facility; Soil covering work for felled trees; Reduction of radiation dose from stored secondary wastes from water treatment through shielding etc.; Evaluation of secondary wastes from water treatment and lifespan of storage containers; Facility renewal plan development
- **Processing/disposal plans for solid wastes**: * Completed for FY2013; Development of R&D plan for safety processing/disposal; Verification of applicability of processing/disposal technologies in Japan and foreign countries; Waste characterization (radiochemistry analysis, assessment of volume etc.)
- **Decommissioning plans for reactor facilities**: Development of feasible and rational decommissioning scenarios; Establishment of decommissioning scenarios

HP ND-1

Implementation system and personnel procurement plan: Systematic cultivation/deployment of personnel, including the cooperative companies, and implementation of measures to stimulate motivation etc.

Plan to ensure the safety of work: Continuation of safety activities, maintenance and enhancement of radiation management, continuous ensurement of medical services, etc.; Reduction of radiation dose in the rest area of the main office building, rest area in front of the important quake-proof building, and the important quake-proof building

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 was to commence 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.
In the SFP, 1,533 fuel assemblies (1,331 of which spent and 202 new) are currently stored. The removed fuel will be transferred to the common pool and completion is scheduled for around the end of 2014.
At present 550 fuel assemblies (528 of which spent and 22 new) have been transferred to the common pool (based on the work completed as of March 26).


Fuel removal status

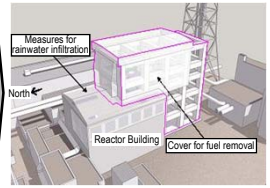

Loading the transportation container to the trailer

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

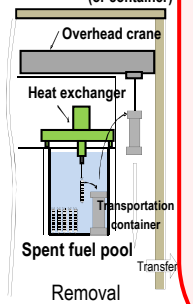
Solid measures for risks, careful checks and safety first

Steps toward fuel removal


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



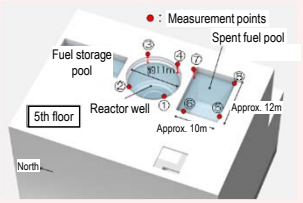
Installation of cover for fuel removal
From Apr. 2012, completed in Nov. 2013



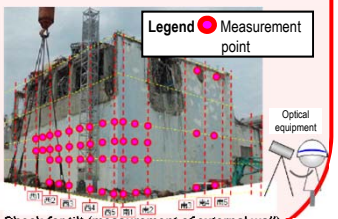
Removal
Commenced in Nov. 2013

Check of the health of the Reactor Building

Since May 2012, regular quarterly inspections have been conducted, which have confirmed that the health of the Reactor Building has been maintained.



Check for tilt (measurement of water level)



Check for tilt (measurement of external wall)

Unit 3

Toward the installation of a cover for fuel removal, installation of the gantry was completed (March 13, 2013). Removal of rubble on 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 system on the operating floor (*1), measures to reduce the radiation dose (decontamination and shielding) have been started (from October 15, 2013). Removal of large rubble from the SFP is underway (from December 17, 2013).

Before removal of the large rubble

After removal of the large rubble

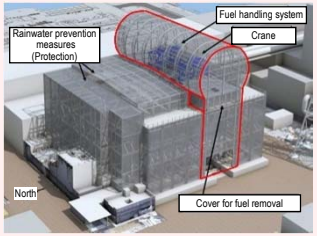


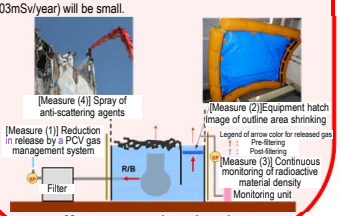
Image of the cover for fuel removal

Units 1 and 2

- Regarding Unit 1, to remove rubble on the top of the operating floor, demolition of the cover over the Reactor Building is planned. Prior to the demolition, the ventilation system of the cover was suspended (September 17, 2013). The next step will involve scheduled construction of a yard for operating large heavy machines and demolition of the Reactor Building cover will commence from the 1st half of FY2014.
- 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.

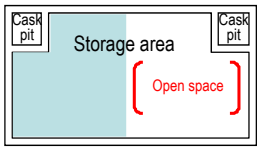
Demolition of the cover over Reactor Building Unit 1

Toward the early removal of fuel and fuel debris from the SFP, the cover over the Reactor Building will be demolished to accelerate the removal of rubble on the operation floor. The radiation dose on the site boundaries will increase compared to that before the demolition. However, with measures taken to reduce the release, the estimated impact of release from Units 1 to 3 on the site boundaries (0.03mSv/year) will be small.



Measures to reduce the release

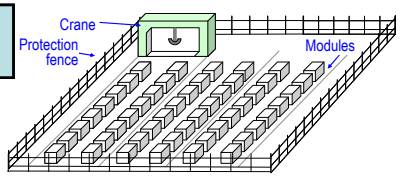
Common pool



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 whereby it can 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 is 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 core internals are inspected.
(*2) Equipment hatch: A through-hole used to carry equipment in and out of the PCV.
(*3) Cask: Transportation container for samples and equipment including radioactive materials.

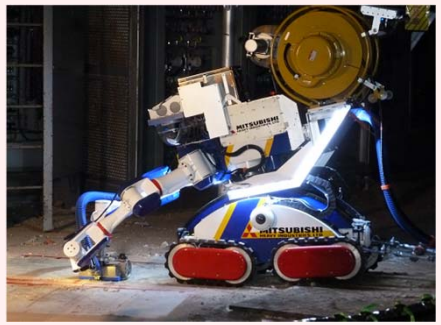
Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

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

Demonstration of aspiration and blast decontamination equipment

- Prior to formulating a decontamination plan inside the Reactor Building toward the future removal of debris, demonstration test of the remote-control decontamination equipment was conducted on the 1st floor of the Unit 1 reactor building from January 30 to February 4. The equipment was developed for the fuel debris removal work in future with the subsidy project of the Ministry of Economy, Trade and Industry.
- 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 following blast decontamination*.

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

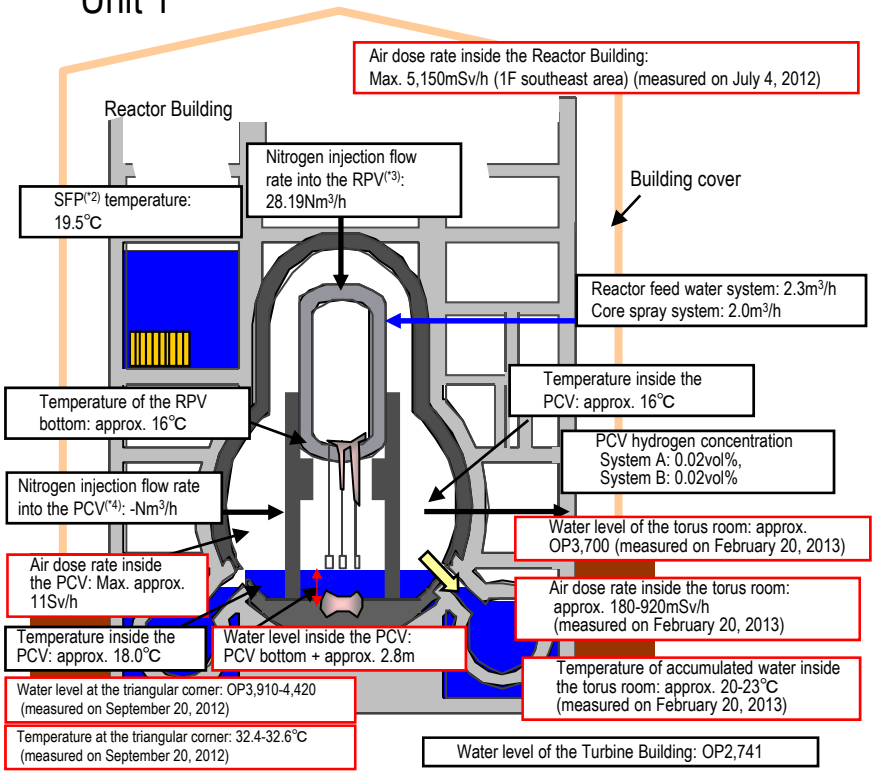


Aspiration and blast decontamination equipment

Response related to the reactor water injection system

- At Unit 1, to ensure the reliability of continuous water injection to the reactor by the core spray system, emergency injection points will be installed on the pipes used to inject nitrogen into the RPV (within FY2014). Examination toward the additional installation of reactor water injection points, which can be constantly used, is underway (from FY2015 to around FY2016).

Unit 1



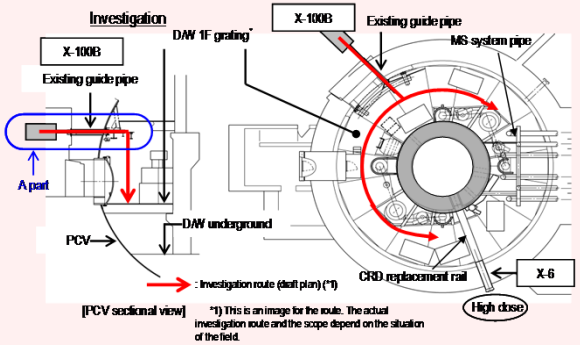
* Indices related to the plant are values as of 11:00, March 26, 2014

Status of equipment development toward investigation inside PCV

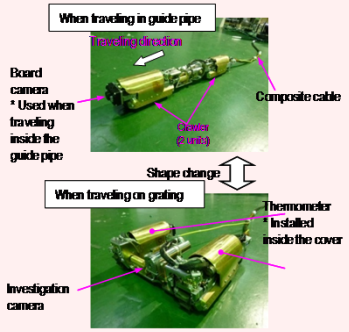
Prior to fuel debris removal, to check the conditions inside the Primary Containment Vessel (PCV), including the location of the fuel debris, investigation inside the PCV is scheduled. For Unit 1, where fuel debris may spread to the outside of the pedestal, the focus will be placed on the investigation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

[Investigation 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 stability travel on the grating is currently under development. A field demonstration is scheduled for the 2nd half of FY2014.



Investigation 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

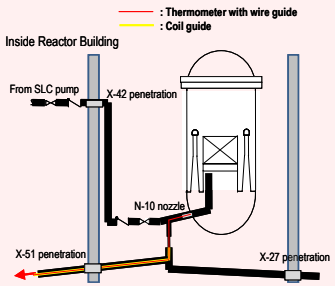
Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

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

Installation of RPV thermometer and permanent PCV supervisory instrumentation

(1) Replacement of RPV thermometer
- As the thermometer installed at Unit 2 RPV bottom after the earthquake had been broken, it was excluded from the monitoring thermometers (February 19).
- The broken thermometer will be removed (scheduled in April) and a new one will be installed (scheduled in May).

(2) Reinstallation of 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 the existing grating (August 13, 2013).
- Based on the field situation, the relevant supervisory instrumentation will be reinstalled by trained workers (in mid-May).

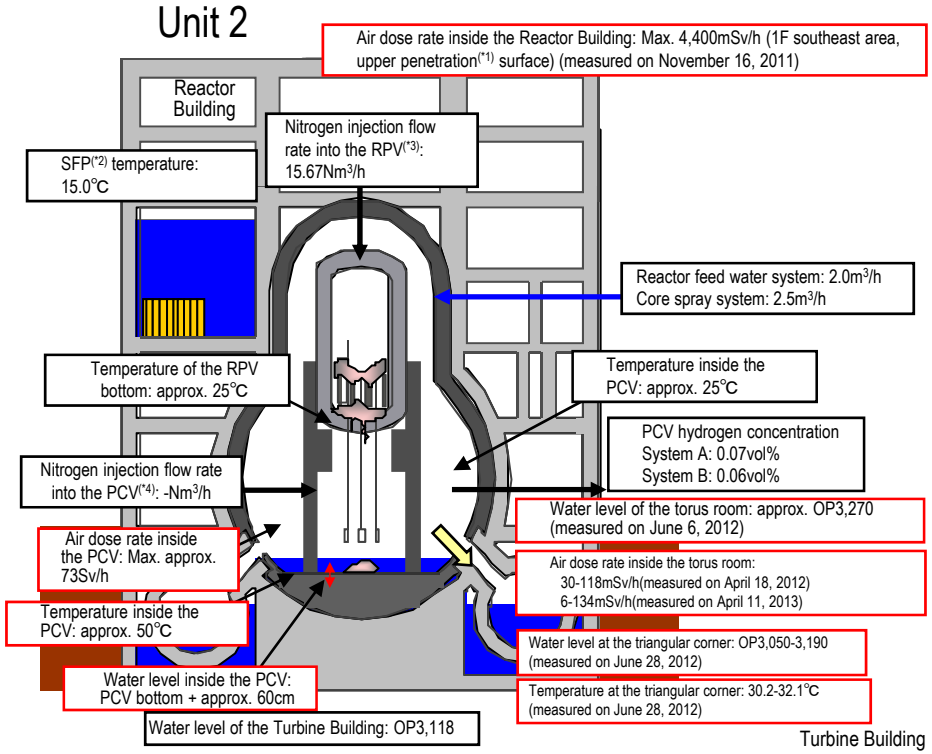


Investigation of the contamination status of the Reactor Building 5th floor

- To investigate the contamination status of the Reactor Building 5th floor, investigative equipment (gamma camera, radiation dose gauge, optical camera) will be suspended through holes drilled in the building roof. In addition, core samples on the 5th floor are collected using remote-control robot.
- To ensure the operation route of the robot for collecting floor core samples, fences on the operating floor (*6) were removed using the remote control robot (March 13 and 14).
- As the robot fell during the operation and the battery became low, the relevant robot could not be collected. Removal of fences was completed and the core was collected within the accessible range (from March 20-26).

Status of remote-control robot falling down

Unit 2



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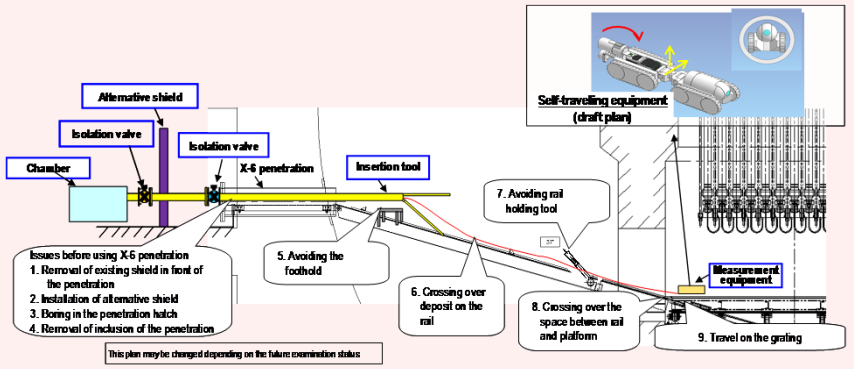
Status of equipment development toward investigation inside the PCV

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

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

[Status of investigative equipment development]
- Based on the issues confirmed by the CRD rail status investigation conducted in August 2013, the investigation method and equipment design are currently examined. The demonstration is scheduled in the field in the 2nd half of FY2014.



Issues of investigation 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) S/C (Suppression Chamber): Suppression pool; used as the water source for the emergency core cooling system.
(*6) Operating floor: During regular inspection, the roof over the reactor is opened while on the operating floor, fuel inside the core is replaced and core internals are inspected.

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

March 27, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment
4/6

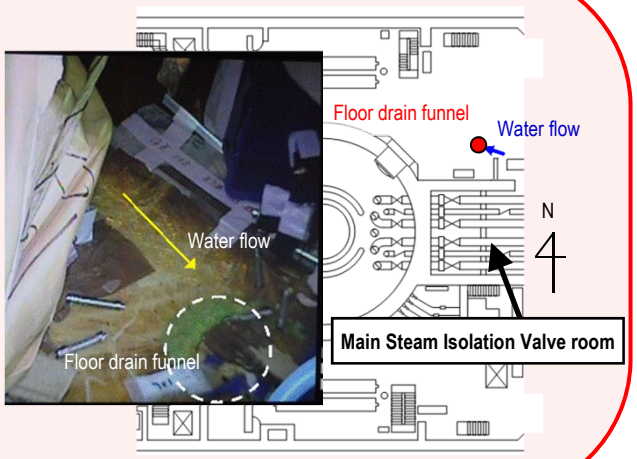
Immediate target | Identify the plant status and commence R&D and decontamination toward fuel debris removal

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

On January 18, the flow of water flow 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.

Based on the analytical results of temperature and radioactive materials of the water flow, and examination by drawings, there is a high likelihood of accumulated water, for which an indoor investigation will be conducted.

* Main Steam Isolation Valve: A valve to shut off the steam generated from the Reactor Building.



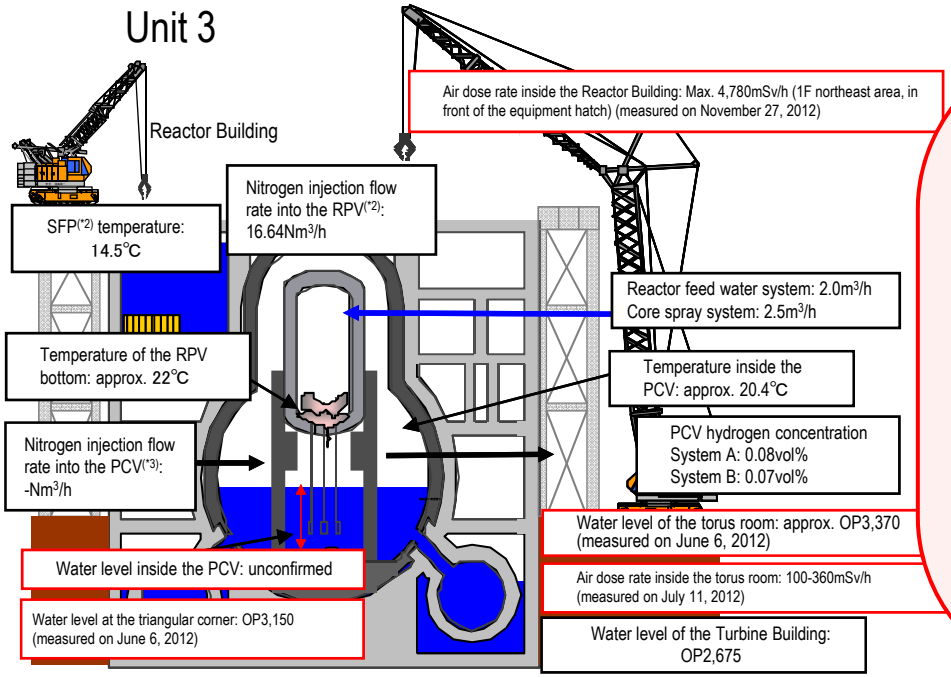
<Outline of the water flow status>

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).
- Toward decontamination inside the Reactor Building, transfer 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, March 26, 2014

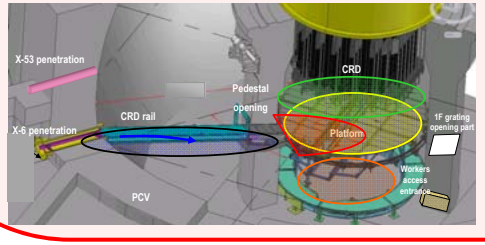
Status of equipment development toward investigation inside the PCV

Prior to fuel debris removal, 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 the possibility of fuel debris spreading outside the pedestal is low, the focus will be placed on investigating the inside. As the water level inside the PCV is high and the penetration which is scheduled for use in Units 1 and 2 may sink in the water, another method need 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 policy 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 sink. It is estimated that access to X-6 penetration is difficult.
- For access from another penetration, approaches such as “further downsizing the equipment” or “moving in water to access the pedestal” are necessary and will be examined.



<Glossary>
(*1) SFP (Spent Fuel Pool)
(*2) RPV (Reactor Pressure Vessel)
(*3) PCV (Primary Containment Vessel)
(*4) TIP (Traversing Incore Probe System)
Measures neutrons by moving the detector up and down inside the core.

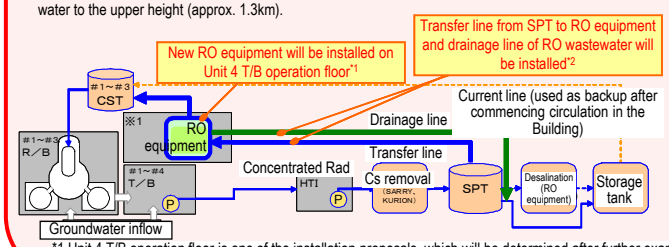
Progress toward decommissioning: Work related to circulation cooling and accumulated water treatment line

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

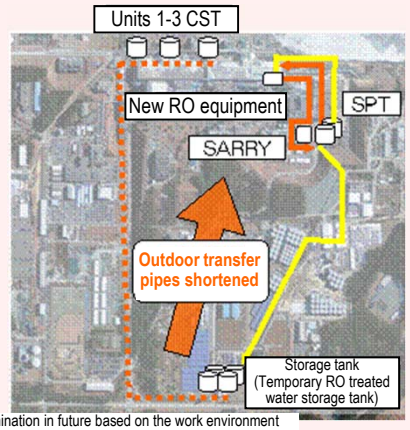
Work to improve the reliability of the circulation water injection cooling system and pipes to transfer accumulated water.

- Operation of the reactor water injection system using Unit 3 CST as a water source commenced (from July 5, 2013). Compared to conventional 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 are approx. 2.1m, including the transfer line of surplus water to the upper height (approx. 1.3km).



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

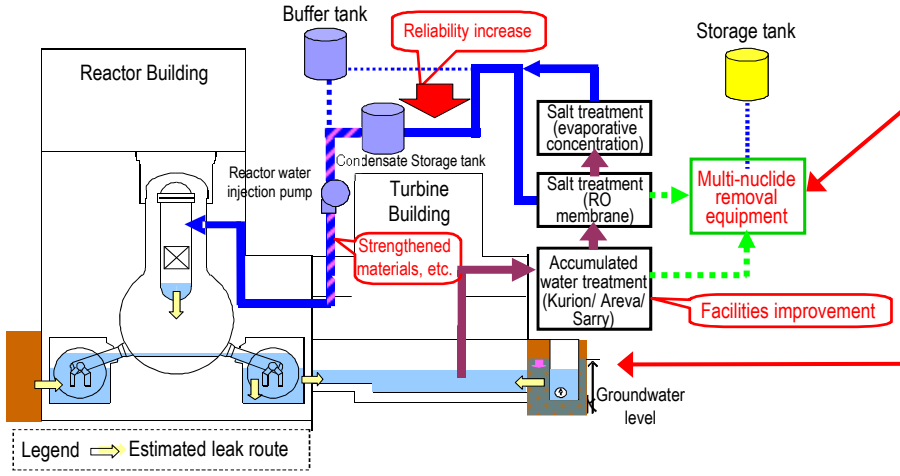


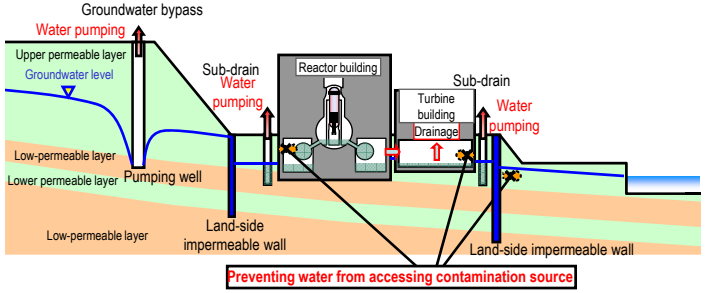
Status of multi-nuclide removal equipment

- 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).
- On March 18, as the radioactive material density of outlet water increased at System B, all Systems were suspended. The estimated cause was that the strontium which had traversed the filter remained in the absorption vessel and, over an extended period, reached the outlet.
- From March 24, treatment for the purpose of cleaning transfer pipes resumed using healthy Systems A and C. To check for any leak from the manhole on the side of the sample tank, which stores outlet water, water was filled under monitoring (March 24). As water drops were detected by this check, System B was suspended. On March 25, the System was resumed after replacing the packing at the relevant part.
- Toward installing additional and high-performance multi-nuclide removal equipment, work to remove obstacles, drill, improve the ground improvement, and construct foundations is underway.

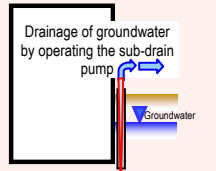
Gray sediment (estimated as carbonate) was detected in the surface layer of the absorbent

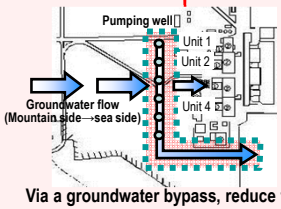
Inside the absorption vessel of Multi-nuclide removal equipment System B





Preventing groundwater from flowing into the Reactor Buildings



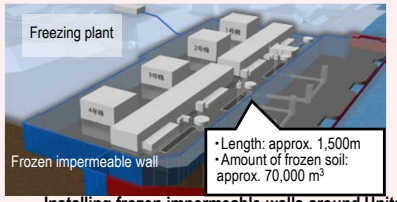


To reduce groundwater level by sub-drain water pumping, treatment tests were conducted for some sub-drain pits of Units 1-4. The next stage will involve scheduled examination of the sub-drain recovery method.

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 groundwater quality has been checked and evaluated to confirm that the radioactive density remains appropriately low compared to rivers around the power station.
Pumped groundwater is temporarily stored in tanks and appropriately operated.
Installation of a pumping well and pumping/transfer facilities are completed.
Based on the water quality result and after obtaining the consent of related parties, operation will commence sequentially.

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. Toward the installation, a feasibility study was conducted on site. From March 14, the freezing test began for small-scale frozen impermeable walls.

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

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

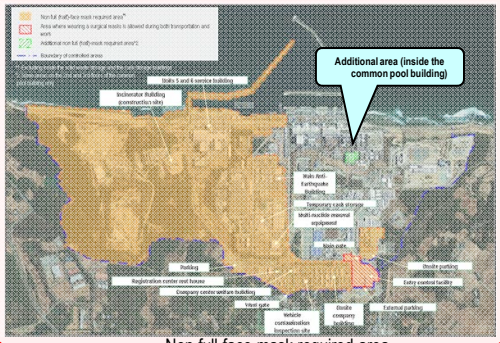
Progress toward decommissioning: Work to improve the environment within the site

Immediate target	・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 non full-face mask required 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.

As it was confirmed that the density of radioactive materials in air is under the level for non full-face mask required area in some parts on the 2nd and 3rd floors of the common pool building, these areas will be set as non full-face mask required area, to reduce burden on workers and improve productivity (from March 10).



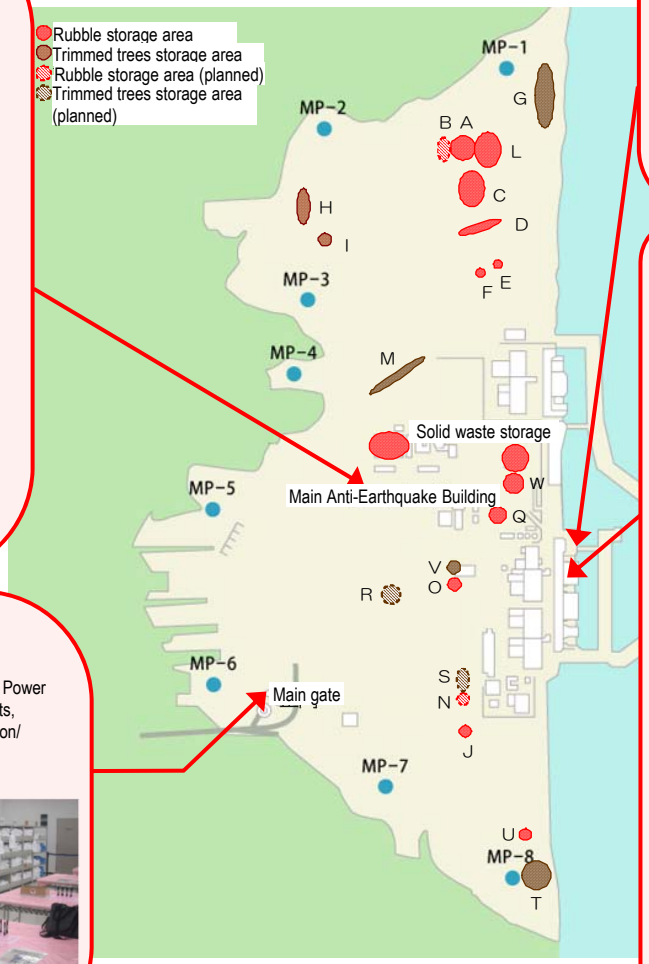
Non full-face mask required area

Entry control facility was established

An entry control facility near the main gate of the Fukushima Daiichi Nuclear Power Station commenced operation from June 30, 2013, where contamination tests, decontamination, switching on and off of protective equipment, and distribution/ collection of dosimeters are being conducted.


External view of the entrance control facility


Inside the entrance control facility



Installation of impermeable walls on the sea side

To prevent contamination expansion into the sea when contaminated water leaks 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

Reducing radioactive materials in seawater within the port

- 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 port 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) Preventing leakage of contaminated water
- Underground soil improvement behind the bank protection to prevent 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)
- Pumping of groundwater in contaminated areas (from August 9, scheduled to commence sequentially)

(2) Isolating groundwater from the contamination source
- Enclosure by improving underground soil on the mountain side

(Between Units 1 and 2: Commenced from August 13, 2013 and scheduled for completion by end March; between Units 2 and 3: Commenced from October 1, 2013 and completed on February 6, 2014; between Units 3 and 4: Commenced from October 19, 2013 and completed on March 5, 2014)
- To prevent the ingress of rainwater, the ground surface is being paved with asphalt (commenced on November 25, 2013)

(3) Removing the contamination source
- Removal and closure of contaminated water such as branch trench (completed on September 19, 2013)
- Purification and removal of contaminated water in the main trench

(Unit 2: Purification commenced on November 14, 2013; Unit 3: commenced on November 15, 2013)
(Frozen water stoppage, water drainage: Freezing is scheduled for commencement by end March)