Progress Status and Future Challenges of the Mid- and Long-Term Roadmap toward 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 approx. 15 to 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 was 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, which is approx. 1/70 of the annual radiation dose received by natural radiation (annual average in Japan: approx. 2.1 mSv/year).

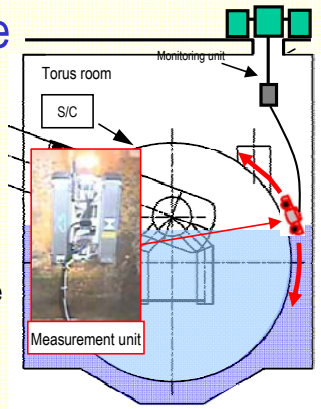
◆ Fuel removal from the Unit 4 spent fuel pool commenced on November 18. As of January 29, 220 spent fuel rods and 22 non-irradiated fuel rods had been transferred to the common pool.

Measurement of water levels inside S/C* of Unit 2

As part of work to investigate and repair leak points of the Suppression Chamber (S/C) Unit 2 using ultrasonic technology, water levels inside the S/C were measured from outside the chamber from January 14 to 16, whereby it was confirmed that the water levels inside the S/C and the torus room were nearly equivalent.

The results of water level measurements will be used to examine water shut-off methods for PCV in future.

* Suppression Chamber (S/C)
A large doughnut-shaped room containing water used as the source of the Emergency Core Cooling System (ECCS), which is stored in the torus room installed to surround the S/C at the bottom of the PCV.

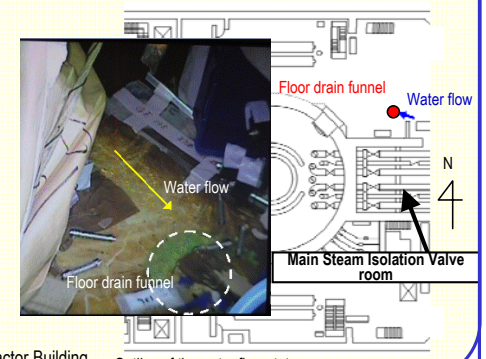


<Water level measurement robot>

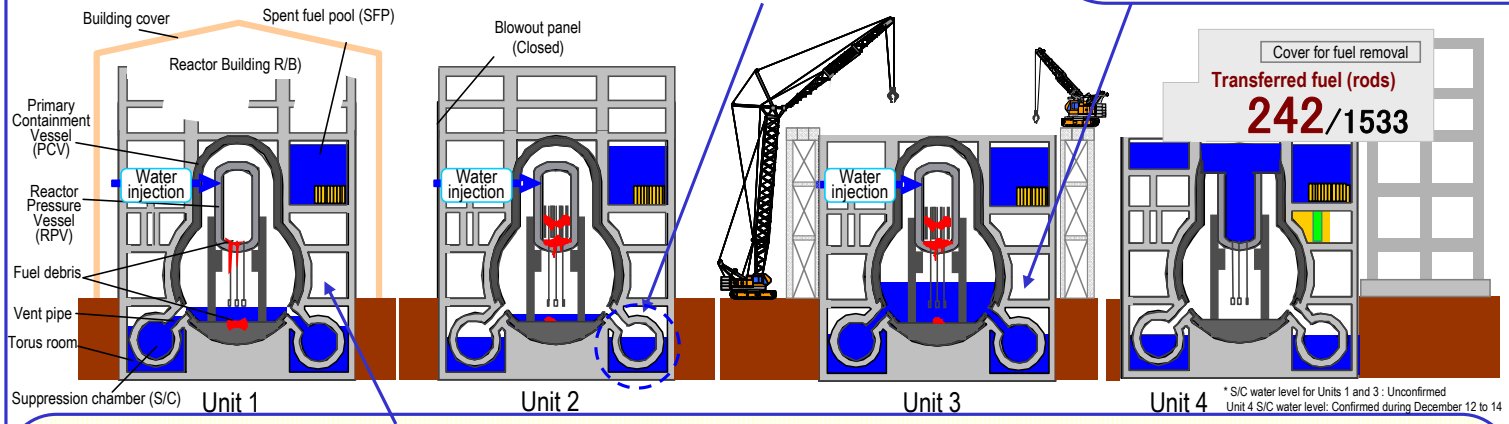
Water flow detected near the Unit 3 Main Steam Isolation Valve* room

On January 18, water flowing 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 floor of Rector Building, there was no possibility of outflow from the building. Based on analytical results of temperature, the water flow of radioactive materials, and examination of drawings, there is a significant 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>



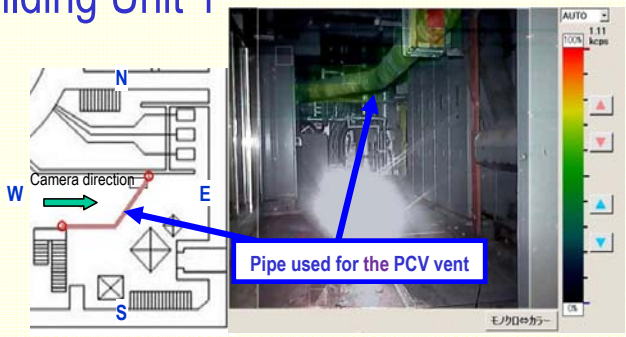
* S/C water level for Units 1 and 3 : Unconfirmed
Unit 4 S/C water level: Confirmed during December 12 to 14

Contamination status survey on Reactor Building Unit 1 1st floor

Toward work to implement the radiation dose reduction plan and decontaminate the Reactor Building, a radiation-source survey using a gamma camera* has been underway on the south side of the Reactor Building Unit 1 1st floor since last December.

The data recorded by the gamma camera showed a high radiation dose on the surface of the pipes where steam traversed the PCV vent at the time of the accident (pipes through which the stream passed).

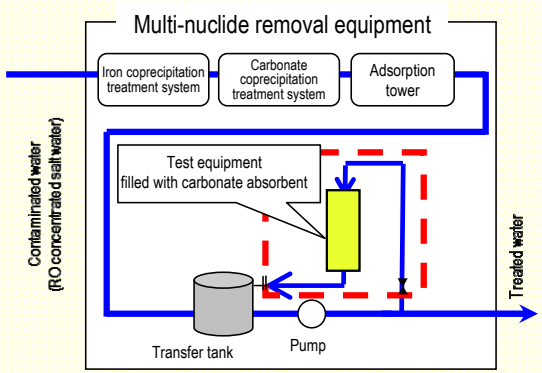
* Gamma camera:
A device that measures radiation (gamma rays) from a specified direction and the distance to the subject surface, and through analysis, visualizes the surface radioactivity levels.



<Gamma camera data around pipe used for the PCV vent>

Performance improvement measures for multi-nuclide removal equipment

Regarding the multi-nuclide removal equipment, four radioactive multi-nuclides such as iodine (excluding tritium) were detected from the treated water. Laboratory tests confirmed that these four multi-nuclides could be removed to below the detection limit using activated carbon adsorbent. At present, a test device containing activated carbon adsorbent is connected to the actual multi-nuclide removal equipment to verify its removal performance.

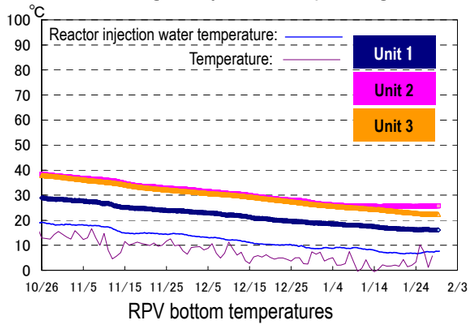


<Removal performance test using actual equipment (in-plant water pass test)>

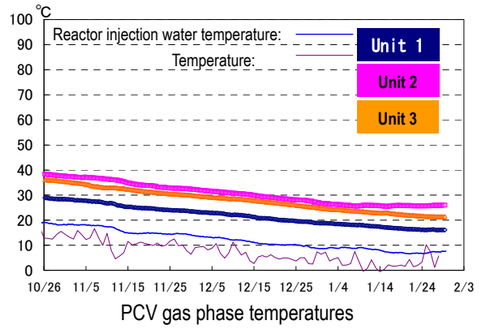
I. Confirmation of the reactor conditions

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 were maintained within the range of approx. 15 to 35℃ for the past month, though they varied depending on the unit and location of the thermometer.



RPV bottom temperatures



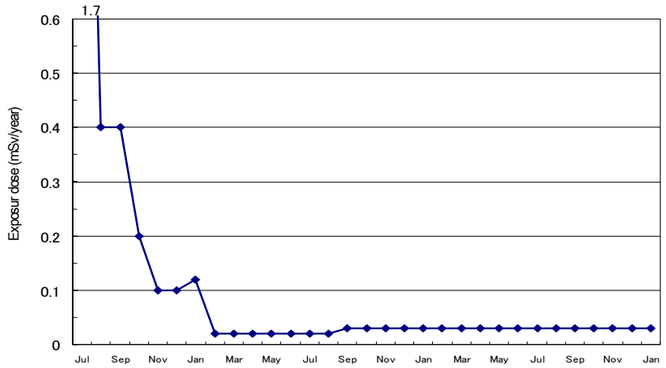
PCV gas phase temperatures

* 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 at on-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 the 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

➢ Response related to the Unit 1 reactor water injection system

- To ensure the reliability of continuous water injection to the reactor, emergency water injection points will be installed on the pipes used to inject nitrogen into the RPV (within FY2014). The additional installation of regularly available reactor water injection points (around 2015-2016) is currently under consideration.

➢ Reinstallation of supervisory instrumentation inside Unit 2 PCV

- During the work in August 2013, some of the supervisory instrumentation (thermometer and water level gauge) was not installed to the planned places, which is considered attributable to the instrumentation becoming stuck in the grating due to twisted cables. After training the workers, the relevant supervisory instrumentation will be reinstalled (in early April).

➢ Reduction of the amount of water injected into Reactor Units 2 and 3

- Aiming to maintain stable reactor cooling while reducing the burden on water treatment facilities, the amount of water injected into the Unit 2 reactor was reduced by 1.0m^3/h to 4.5m^3/h (January 8 and 15). As for Unit 3, the same reduction will be implemented in February.

2. Accumulated water treatment plan

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

➢ Preventing groundwater from flowing into the Reactor Buildings

- At groundwater bypass pumping well Nos. 5 to 12, gross β and H-3 densities are continuously measured. No major variation was detected.
- As part of the operation to commence the sub-drain facility at the end of September 2014, drilling in seven of 13 new pits had been completed as of January 28. At the same time, the water quality in new and existing pits scheduled for recovery was analyzed; revealing that the accumulated water in the pits could be treated by the currently planned sub-drain water treatment system.

➢ Operation of the multi-nuclide removal equipment

- Hot tests using water, which includes radioactive materials, also commenced (System A: from March 30, System B: from June 13, System C: from September 27). To date, approx. 44,000 m^3 has been treated (as of January 28).
- To verify the treatment capacity of 500 m^3/day (design specification), two systems were in treatment operation and one system was in standby operation to replace the High Integrity Container (HIC).
- In the HIC replacement crane, traveling troubles occurred during the HIC replacement for B system (January 7). Following investigation of the cause, an abnormality was detected in one of the four traveling motors for wheel driving (January 9). The crane was operated by dual wheels using two normal traveling motors (January 10). Motors in which an abnormality was detected were replaced and the four-wheel driving was recovered (January 23).
- System A was suspended from January 20-23. From January 24, in response to the detection of four radioactive nuclides (except for tritium) such as iodine 129 in the treated water, measures to improve performance with actual equipment using activated carbon adsorbent were launched (until mid-March).
- System B has been suspended since January 24 to verify the effectiveness of anti-corrosion measures. After confirming their effectiveness, treatment will resume in mid-February.
- As for System C, treatment operation continues except during standby operation for HIC replacement.
- After verifying the effectiveness of anti-corrosion measures of System B, and confirming the training status for operators and the operation of equipment, a shift to three-system operation is currently under consideration.

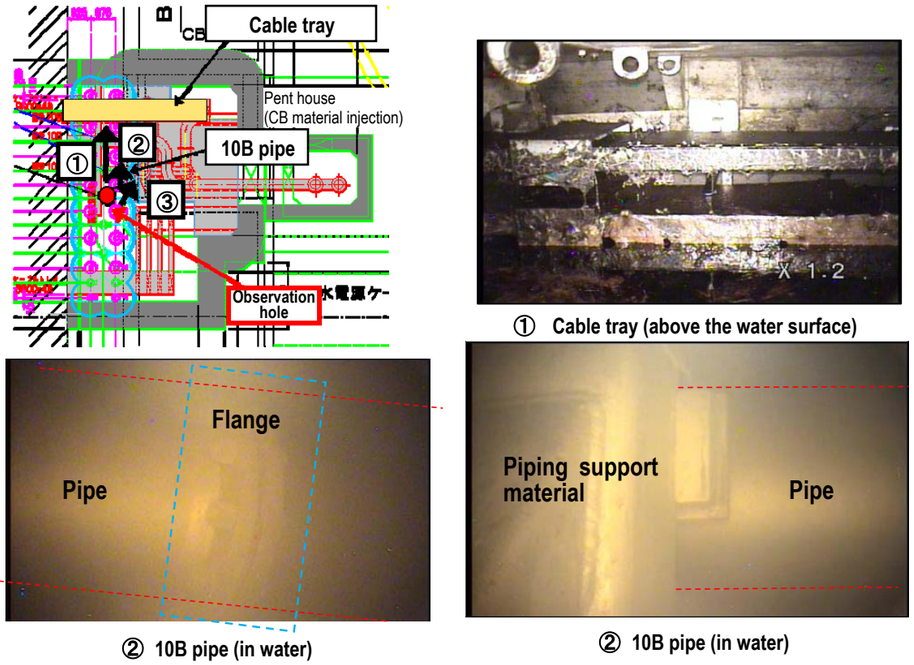
➢ Measures in the Tank Area

- As an additional and redundant measure to prevent radioactive strontium in the contaminated water in the H4 tank area, a leak of which was detected in August 2013, from entering the ocean, the applicability of ground improvement using a material(apatite) to collect strontium within the soil is currently under consideration. From February, demonstration tests to verify its effectiveness will be conducted on site.

➢ 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 in operation (Unit 2: from November 14, Unit 3: from November 15). The operation was suspended to inspect the power panel (Unit 2: from January 16-27, Unit 3: from January 17-28) and resumed after the suspension period.
- Toward contaminated water removal from May 2014, drilling and installation of frozen ducts are in operation (Unit 2: from December 2013 to early April (provisional)). The status of the points for the planned freeze and water stoppage of Main Trench Unit 2 (Vertical Shaft A) was investigated using a camera (see Figure 1), which confirmed that the

cable tray and pipes had been equivalent to the design drawing.



① Cable tray (above the water surface)

② 10B pipe (in water)

② 10B pipe (in water)

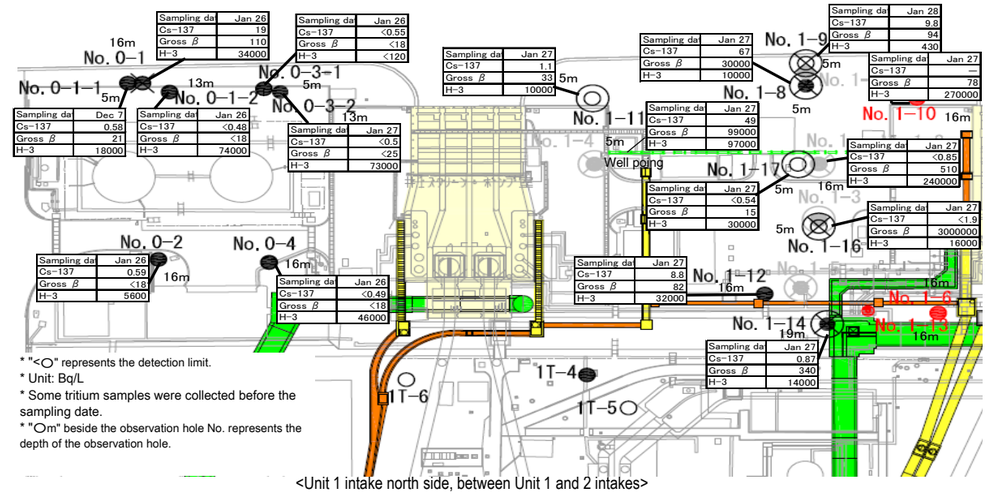
Figure 1: Unit 2 Main Trench vertical shaft A camera observation status

3. Plan to reduce radiation dose and mitigate contamination

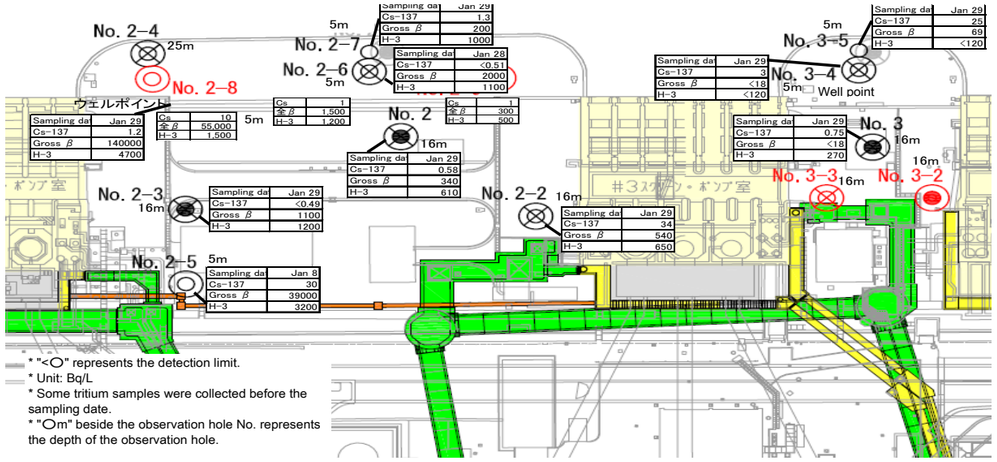
Effective dose-reduction at site boundaries (reduced 1 mSv/year by the end of FY 2012) and purification of the water in the port to mitigate the impact of radiation on the outside environment

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

- Regarding the groundwater near the bank on the north side of the Unit 1 intake, a high density of tritium (approx. 10^4Bq/L) was detected in the lower layer (sandstone bed). Though 1 m^3/day of water has been pumped up from Observation Hole No. 0-3-2 (from December 11-13 and from December 16, ongoing), no decrease was confirmed.
- Regarding the groundwater near the bank between the Unit 1 and 2 intakes, water pumping from the well point continued (45 m^3/day). The gross β radioactive material density at the groundwater Observation Hole No. 1-16, which tended to increase, was maintained at 10^6 Bq/L. The tritium density at the groundwater Observation Holes Nos. 1-11 and 1-12 is decreasing (approx. 10^4Bq/L).
- Regarding the groundwater near the bank between Units 2 and 3, the gross β radioactive material density at the ground water Observation Hole No. 2-6, which had increased, was maintained at around 10^3Bq/L. Pumping up (2m^3/day) from the north side of the well point continues.
- Regarding the groundwater near the bank between the Unit 3 and 4 intakes, no increase was detected during the past one month.
- 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 accordance with progress in installing the seaside impermeable walls, concrete placement in water and landfilling inside the impermeable walls are underway, beginning with the north area. In response, the silt fences in front of the intakes will be removed (after the end of January) and seawater monitoring points within the open intake channels will be reviewed (after mid-February).
- Analysis of strontium 90 had not progressed due to the increased number of samples and need to verify the analytical results. By introducing a method using β multi-nuclide analysis equipment, which requires fewer complex chemical processes, the analysis time is reduced. With an increased number of analysts, the analysis is underway.



<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

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

- Removal of fuel from the spent fuel pool (SFP) commenced on November 18.
- As of the end of work on January 29, 220 of 1331 spent fuel assemblies and 22 of 202 non-irradiated fuel assemblies had been transferred to the common pool.
- To examine the treatment of the fuel assembly (per assembly), the handle/channel boxes of which had been deformed by mistake in 1982, within the on-site transportation container, the degree of deformation was checked (December 26-27). The result showed the outlook that it could be stored in the existing on-site transportation cask. In the next step, after confirming the details and taking the necessary actions, the relevant fuel assembly will be transferred to the common pool.

➢ Main works toward removing spent fuel at Unit 3

- The removal of rubble such as steel, deck plates, and roof torus is in operation (scheduled for completion in early February). The next step will involve the scheduled removal of masts and fuel exchangers based on the progress of the work.
- Before installing a fuel-removal cover, the frame of the Reactor Building is currently being investigated (from December 19 and scheduled for completion on January 31) following the removal of rubble from the operating floor. If any new damage is detected by this investigation, an additional assessment will be conducted.

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)

➢ Water flow detected near the Unit 3 Main Steam Isolation Valve room

- Water flow was detected from the door of the Main Steam Isolation Valve room at the northwest area on 1st floor of Unit 3 Reactor Building to the floor drain funnel (drain outlet) via camera images of the rubble removal robot (January 18). As the relevant water flows into the drain outlet that connects with the underground section of the Reactor Building, there is no possibility of outflow from the building.
- Based on the analytical results of temperature, the radioactive materials of the water flow, and examination of the drawings, there is a high likelihood of accumulated water. The next step will involve scheduled investigation of the through-holes in the Main Steam Isolation Valve room (the process is under examination).

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

- Toward the future implementation of a radiation dose-reduction plan and decontamination, a radiation source survey using a gamma (γ) camera was conducted on the south side of the Reactor Building Unit 1 1st floor (from December 22-24). Evaluating the data obtained confirmed that the radiation dose was high on the surface of the pipes carrying steam during the PCV vent at the time of the accident. Processing of the gamma camera data will continue to check the distribution of contamination (until the end of March).
- To check for the infiltration of contamination into the concrete of the building on the south side of the Reactor Building Unit 1 1st floor, the floor surface will be excavated to collect samples (in early February).
- To check the radiation dose impact from the top of the Reactor Building Unit 2 1st floor, surveys of the surface dose rate and surface contamination density of the upper part were conducted (from January 21-28). As of January 30, this analysis was underway.
- On the Reactor Building Unit 2 5th floor (operating floor), a contamination distribution survey by inserting a γ camera from the roof, and core boring sampling by the robot to check for infiltration contamination, will be conducted (from January 28 to the end of March).
- On the Reactor Building Units 1 and 2 1st floor, a demonstration test involving remote decontamination equipment for the lower part, which had been developed in a national project, is underway (from January 30 to the end of April).

➢ Demonstration of the water level measurement robot inside the Suppression Chamber (S/C) of Unit 2

- The demonstration of water level measurement technology inside the S/C (measuring water levels inside the S/C from outside using ultrasonic waves) developed by the national project was conducted (from January 14-16), whereby it was confirmed that the water levels inside the S/C and the torus room were nearly the same. Based on the measurement results, the opening area of the leak route is estimated to be 8 to 10 cm^2 (if circular, its diameter is estimated to be approx. 3.2 to 3.6 cm). These results will be used for future examination of water shut-off methods for PCV.

➢ Evaluation results of water flow points around the lower part of the Unit 1 vent pipe

- In November 2013, a survey using a water boat was conducted and the water flow at some vent pipes and sand cushion drain pipes was detected. Based on the camera images and the reproduction test, the flow rate detected in this survey is estimated at approx. 0.89 to 3.35 m^3/h. As this amount is lower than the amount injected into the reactor (4.4 m^3/h), it is estimated that water is flowing from other parts, including other drain pipes.
- The next step will involve scheduled investigation of leaking water from the upper part of S/C using the "S/C upper part investigation equipment" which is currently being developed by the National project (in the 1st half of FY2014).

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

➢ Management status of rubble and trimmed trees

- As of the end of December the total storage volume of concrete and metal rubble was approx. 69,000 m^3 (area occupation rate: 75%). The total storage volume of trimmed trees was approx. 78,000 m^3 (area occupation rate: 60%).

➢ Management status of secondary waste from water treatment

- As of January 28, the total storage volume of waste sludge was 597 m^3 (area occupation rate: 85%). The total storage number of spent vessels was 758 (area occupation rate: 30%).

➢ Radioactivity analysis of rubble and trimmed trees

- As an inventory (radioactivity density, total amount, etc.) is required for the examination of treatment and disposal methods of rubble, radioactivity analysis was conducted using actual samples. Given the various conditions and large quantity of rubble involved when establishing a simple inventory evaluation method, radioactivity data were accumulated to estimate the inventory by combining the radioactivity analysis results and analytical methods.
- Among the rubble and trimmed trees collected in June and July 2012, for three rubble samples and two trimmed tree samples, the radioactivity data were obtained and evaluated.

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 September to November, 2013 was approx. 8,500 (TEPCO and partner company workers), which exceeds the monthly average number of workers (approx. 6,400). Accordingly, sufficient people are registered to work on-site.
- It was confirmed that the estimated manpower necessary for the work in February (approx. 3,690 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) are as shown in the figure below, with approx. 3,000 to 3,500 per month (See Figure 3).

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

➢ Efforts to improve the labor environment

- The candidate venue for the meal center will be selected in Ohgawara district of Ohkuma town (to be selected by the end of FY2014).
- Construction of a large-scale rest house commenced on January 27 (scheduled for completion by the end of December 2014).
- Removal of scrapped automobiles is underway (18 out of 25 automobiles removed) (scheduled for completion by mid-March 2014).

➢ Outbreak status of influenza and norovirus

- As of January 20, 17 persons were infected with influenza and 20 persons, with norovirus during this fiscal year. Thorough infection-control measures will be continued. (Accumulated totals last year were 204 for influenza and 37 for norovirus patients).

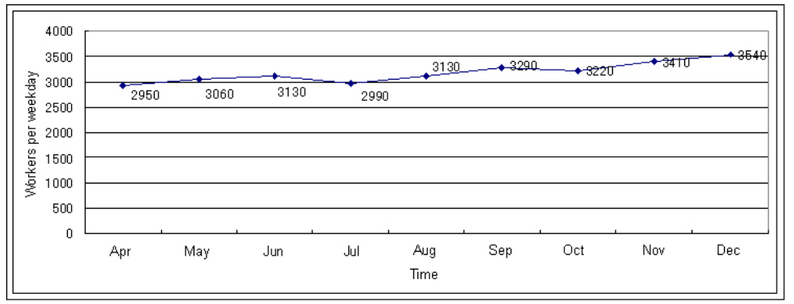


Figure 3: Changes in the average number of workers per day for each month in fiscal 2013 (actual values)

8. Others

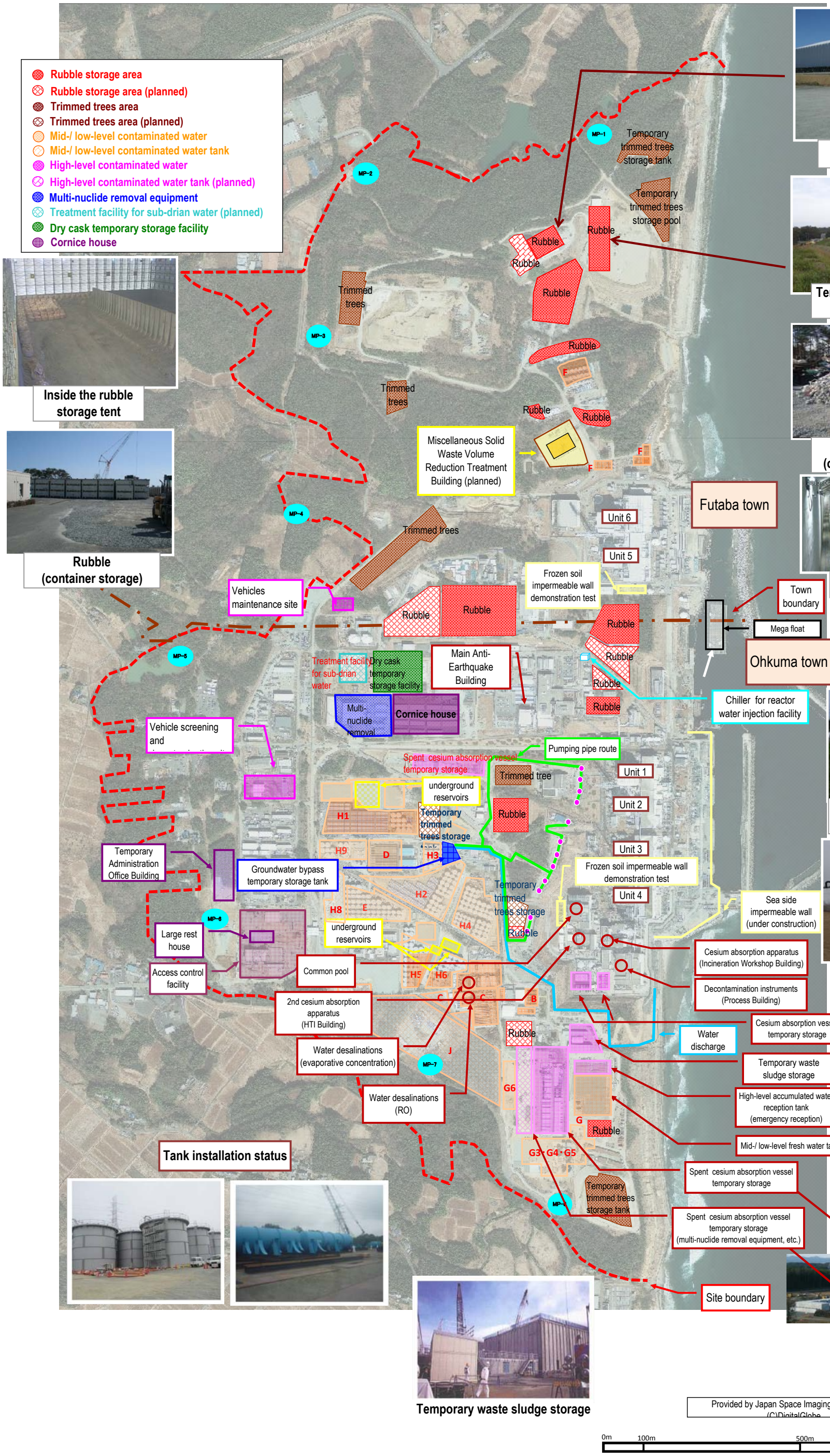
➢ Workshop concerning the R&D plan and basic research toward decommissioning

- Based on the mid- to long-term roadmap, workshops aiming to identify and create the basic research expected to be conducted by universities and research institutes (co-organized by the Ministry of Education, Culture, Sports, Science and Technology and IRID) were held in a total of nine nationwide venues. Based on the results of this workshop and in collaboration with the focal areas related to R&D of the decommission technology examined by IRID, research subjects for the project "Expenses for commission for the basic research on decommission measures and human resource development program" implemented by the same Ministry from the next fiscal year will be adopted.

Appendix 1

January 30, 2014

TEPCO Fukushima Daiichi Nuclear Power Station Site Layout



Rubble storage tent

Temporary soil cover type storage

Inside the rubble storage tent

Rubble (outdoor accumulation)

Rubble (container storage)

Solid waste storage

Rubble (outdoor accumulation)

Temporary trimmed trees storage tank

Trimmed trees (outdoor accumulation)

Tank installation status

Temporary waste sludge storage

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 January 30, 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 of the PCV
- 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
- Reliability improvement measures for the lines taking water supplies from the condensate water storage tanks of Units 1 to 3
- The circulating injection cooling system (water intake from the reactor building (or the lower part of the reactor containment vessel))
- 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 poo
- 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 → 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 January 30, 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
- Decontamination, shielding, etc. in the building (Work environment improvement (1))
- First floor of the reactor building
- 2nd and upper floors 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

Inspection/repair of leaking locations of the PCV
- R&D for inspection/repair of leaking locations of the PCV (including stop leakage between buildings).
- 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 and leaking locations ☆
- [Unit 2] Inspection of the basement of the nuclear reactor building and leaking locations ☆
- ☆: Including on-site demonstration

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 January 30, 2014

Challenges	Phase 1 (no later than 2 years after the completion of the current		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).
- 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
- 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 (Reduce accumulated water)

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
- Consideration of technologies for decontaminating radioactive strontium (Sr)
- Objective: Reduction of the concentration of radioactive substances contained in the seawater of the harbor (to less than the notified concentration)
- 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)
- * Underway toward design confirmation

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
- 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 January 30, 2014

Challenges	Phase 1 (no later than 2 years after the completion of the current		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; Improvement of waste reducing management policy; Establishment of vehicle maintenance shops; Update the storage management plan; Improvement of waste storage management; 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**: 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; HP ND-1; Establishment of decommissioning scenarios

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 rods (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 242 fuel rods (220 of which spent and 22 new) have been transferred to the common pool (based on the work completed as of January 29).

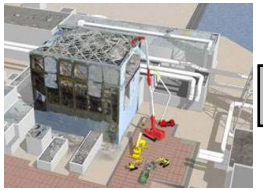

Fuel removal status

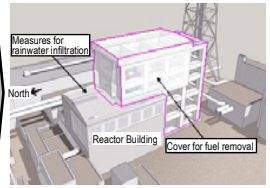

Loading the transportation container to the trailer

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

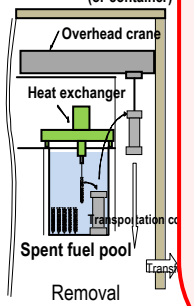
Solid measures for risks, careful checks and safety first

Steps toward fuel removal


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



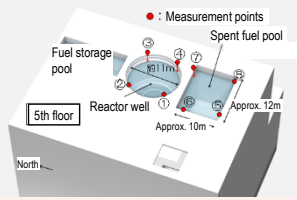
Installation of cover for fuel removal
From Apr. 2012, completed in Nov. 2013



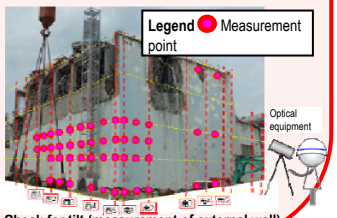
Removal
Commenced in Nov. 2013

Check of the health of the Reactor Building

Since May 2012, regular inspections have been conducted quarterly, 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

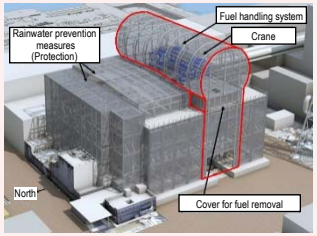


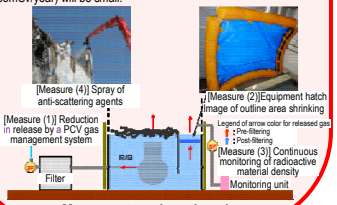
Image of the cover for fuel removal

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 around the end of FY2013.
- 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.

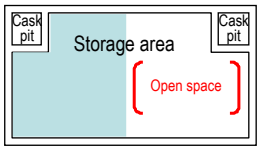
Demolition of the cover over Reactor Building Unit 1

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

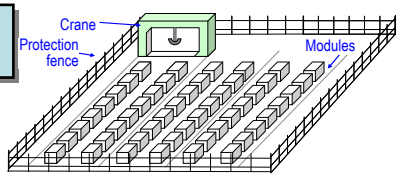
Common pool



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 the 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 the regular inspection, the roof over the reactor is opened and on the operating floor, replacement of fuel inside the core and inspection of core internals are conducted.
(*2) Equipment hatch: Through hole used for carry-in and out of equipment inside the PCV.
(*3) Cask: Transportation container for samples and equipment which include radioactive materials.

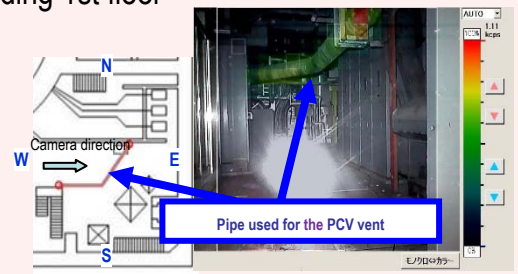
Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

January 30, 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

Survey of radiation dose on the Reactor Building 1st floor

- Toward implementing the radiation dose reduction plan and decontaminating the Reactor Building, a radiation-source survey using a gamma camera* got underway on the south side of the Reactor Building Unit 1 1st floor (from December 22-24, 2013).
- From the recorded data, a high radiation dose was confirmed on the surface of pipes used for the PVC vent.



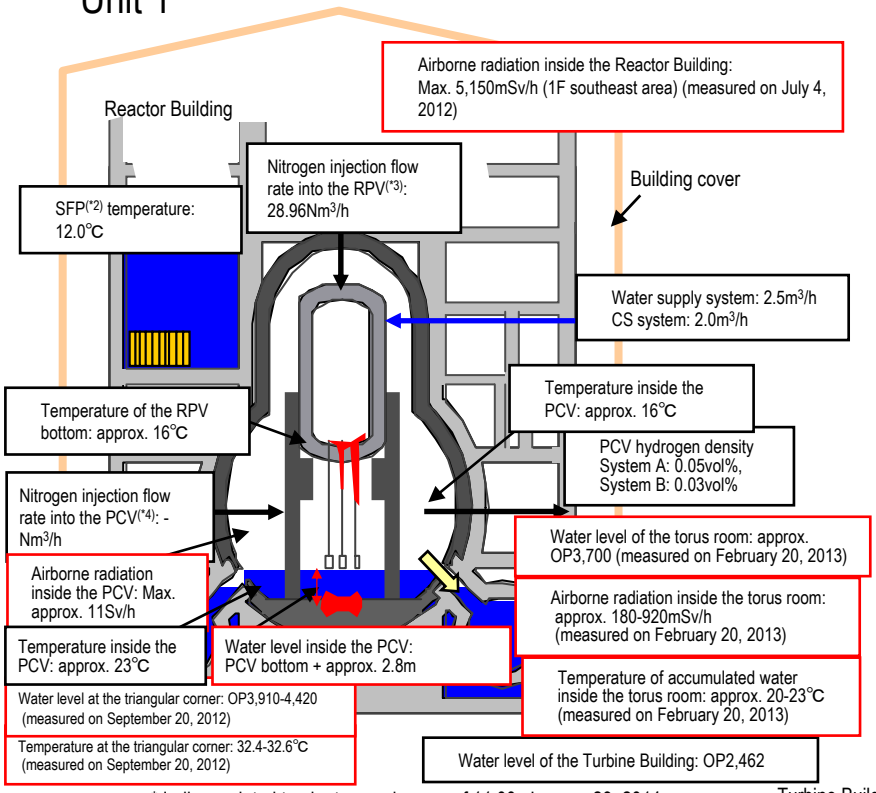
<Gamma camera data around the pipe used for the PCV vent>

* Gamma camera:
A device that measures radiation (gamma rays) from a specified direction and the distance to the subject surface, and through analysis, visualizes surface radioactivity levels.

Response related to the reactor water injection system

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

Unit 1



* Indices related to plant are values as of 11:00, January 29, 2014

Investigation and repair (water shut-off) toward water filling of the PCV

Investigation of existing technology, estimation of potential leak points, and examination of investigation and repair (water shut-off) methods for the estimated leak points are currently underway. To identify the status inside the torus room, the following investigation was conducted:
① A CCD camera was installed from the through-hole of the Reactor Building 1st floor to investigate the accumulated water level, temperature, radiation dose and transparency inside the torus room and the deposits on the bottom of the same (June 26, 2012).
② At the two triangular corners, the level and temperature of the accumulated water were measured and sampling was performed (September 20, 2012).
③ On the Reactor Building 1st floor, boring was conducted (from February 13-14, 2013) to investigate inside the torus room (February 20 and 22).
④ Investigation of the personal air lock room (PCV entrance) on the Reactor Building 1st floor was conducted (April 9, 2013).
⑧ Images taken by a camera mounted on the water boat, which was developed by the project of the Resources and Energy Agency, detected water flow in some vent pipes and sand cushion drain pipes (November 13-14, 2013). Based on the camera images and the reproduction test, as the flow rate detected in this survey is evaluated as being lower than the amount injected to the reactor, it is estimated that water is flowing from other parts.

Status of leak water from the sand cushion drain pipe and above the vent pipe

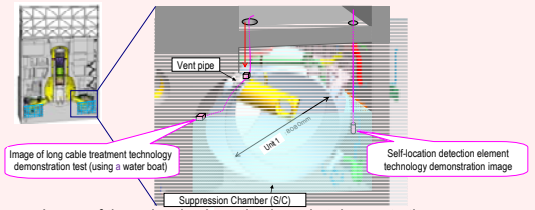


Image of the swimming investigation robot demonstration

<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)

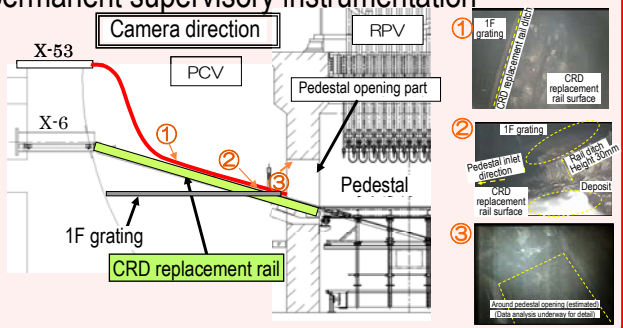
Progress toward decommissioning: Works to identify the plant status and toward fuel debris removal

January 30, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment
3/6

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

Investigation of the inside of the PCV/ installation of permanent supervisory instrumentation

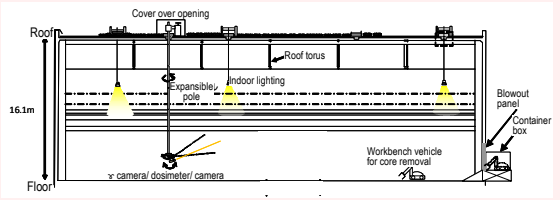
- To identify the status inside the PCV, reinvestigation was conducted (August 2, 12, 2013). From the through-hole of the PCV, the investigative equipment was led to the CRD exchange rail to investigate down to near the pedestal opening. The camera images will be analyzed and reflected in the future investigation plan inside the pedestal.
- Some of the permanent supervisory instrumentation for PCV could not be installed in the planned places due to interference with the existing grating (August 13, 2013).
- The estimated reason is the fact that the instrumentation got stuck in the grating due to twisted cables. After training the workers, the relevant supervisory instrumentation will be reinstalled (in early April).



Status inside the PCV

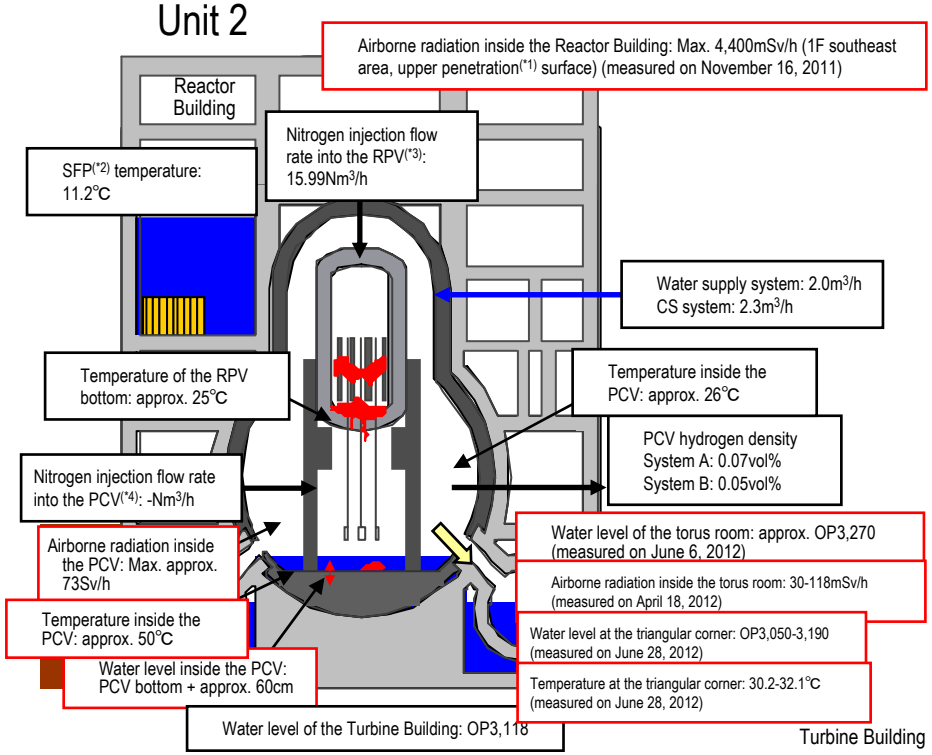
Investigation of the contamination status of the Reactor Building 5th floor

- To investigate the contamination status of the Reactor Building 5th floor, the investigative equipment (gamma camera, radiation dose gauge, optical camera) will be suspended through holes drilled in the building roof. In addition, a remote workbench vehicle for core sampling was also inserted to collect core samples on the 5th floor.



Outline of investigation of the Reactor Building 5F

Unit 2

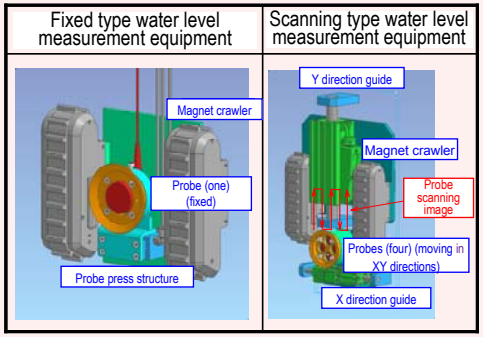


* Indices related to plant are values as of 11:00, January 29, 2014

Investigation and repair of the PCV

Investigation of existing technology, estimation of potential leak points, and examination of means of investigating and repairing (shutting off water) for the estimated leak points are currently underway. To identify the status inside the torus room, the following investigation will be conducted:

① Using a robot, the radiation dose and sound inside the torus room were measured (April 18, 2012), but the leak point could not be determined due to the lack of data collected.
② An investigation to measure the S/C water level by measuring the temperature of the S/C (*5) surface using an infra-red camera was conducted (June 12, 2012), which failed to identify the S/C water level (the boundary between the liquid and air phases).
③ Inside the torus room and the stair room at the northwest triangular corner, accumulated water levels were measured (June 6, 2012).
④ At four triangular corners, the levels and temperature of the accumulated water were measured and sampling was conducted (June 28, 2012).
⑤ On the Reactor Building 1st floor, drilling was conducted to make a hole (March 24-25), through which the torus room was investigated (April 11-12).
⑥ Investigation inside the Reactor Building MSIV (Main Steam Isolation Valve) room was conducted (April 16).
⑦ A demonstration test for remote technology to measure the water level inside the S/C developed by the Resources and Energy Agency was conducted (September 20 and 24), but failed to measure the water level inside the S/C.
⑧ The measurement method was improved to confirm that the water levels inside the S/C and the torus room were the same.



Equipment developed to measure the water level

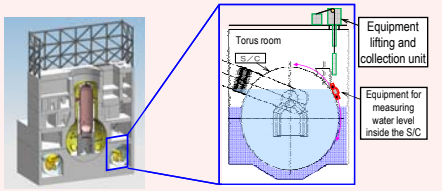


Image to measure the water level inside the S/C

<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 of the emergency reactor cooling system.

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

January 30, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment
4/6

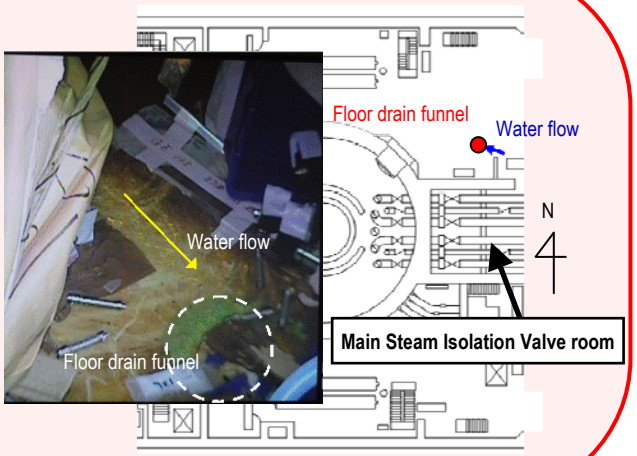
Immediate target | Identify the plant status and commence R&D and decontamination toward fuel debris removal

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

On January 18, 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 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.



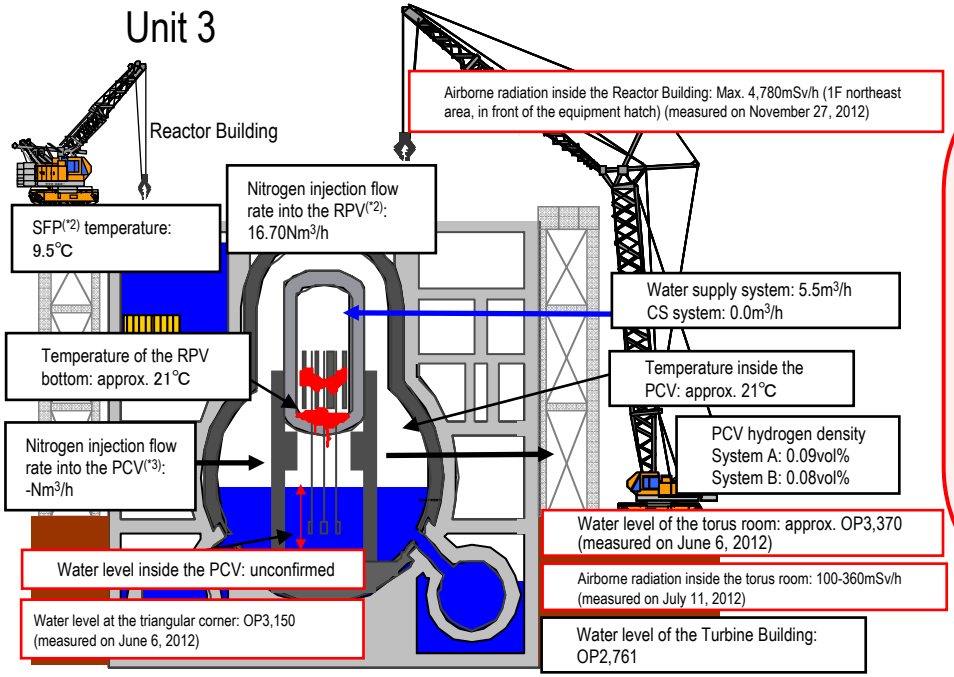
<Outline of the water flow status>

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 is underway (from November 18, 2013).

Robot for investigating contamination status (gamma camera mounted)

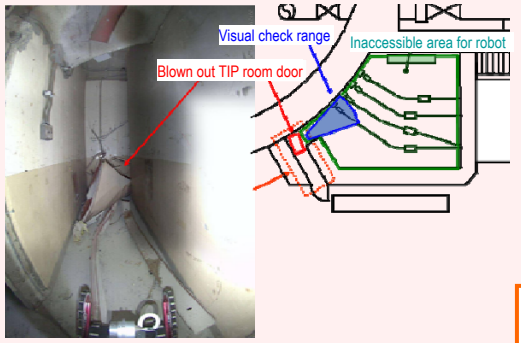
Unit 3



* Indices related to plant are values as of 11:00, January 29, 2014
(Values of Unit 3 SFP temperature are as of 5:00, December 25, due to inspection of the valves)

Investigation inside the PCV

Toward investigation inside the Primary Containment Vessel (PCV), the work environment inside the Reactor Building 1st floor TIP (*4) was investigated by a robot (May 23, 2012).



○Disturbed by the blown out TIP room door, the robot could not move beyond the labyrinth part.

○A staff member, who visually checked around the entrance into the TIP room, **detected no significant damage to the equipment,** including the TIP guiding pipe, within the visual range.

<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

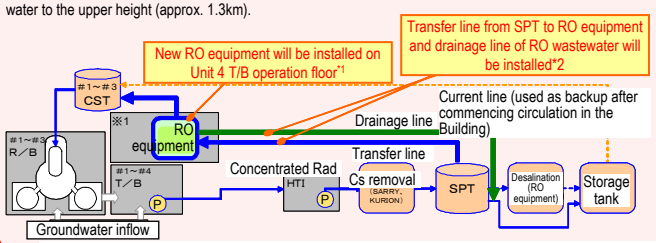
January 30, 2014
Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment
5/6

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

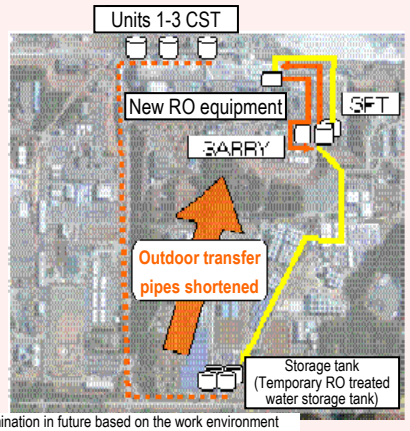
Work to improve the reliability of the circulation water injection cooling system and pipes to transfer accumulated water commenced (from July 5, 2013).

- Operation of the reactor water injection system using Unit 3 CST as a water source commenced. 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).



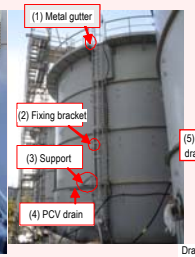
*1 Unit 4 T/B operation floor is one of the installation proposals, which will be determined after further examination in future based on the work environment
*2 A detailed line configuration will be determined after further examination in future

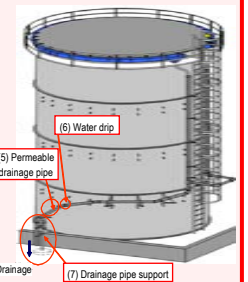


Progress of measures in tank areas

- To reduce the risks of rainwater overflowing from fences around the tanks, steel plates are being added to increase the height of the existing concrete fences by approx. 30 cm (completed on December 28).
- Gutters are being installed in areas where significant contamination within the fences was previously detected (as of January 9). For other parts, gutters will also be installed sequentially.
- For concrete surface inside the tank fences, cleaning and urethane painting are sequentially implemented to enhance their waterproofing.

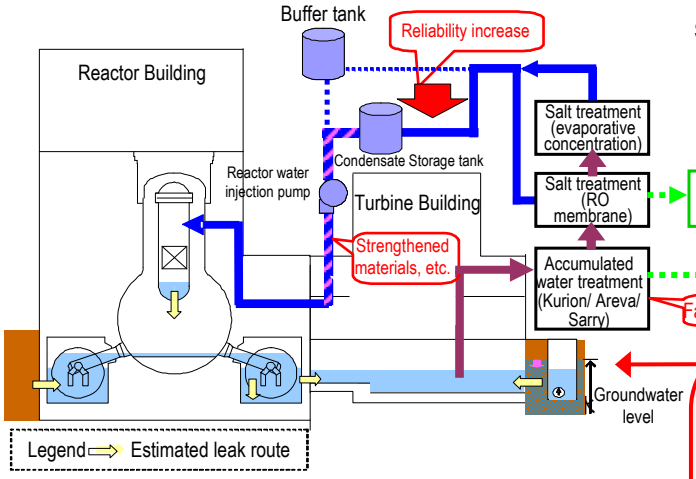
Height increase using steel plates





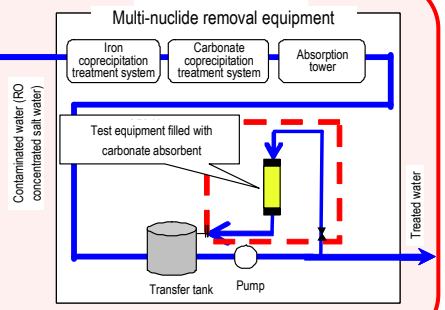
Gutter installation

Progress status of measures



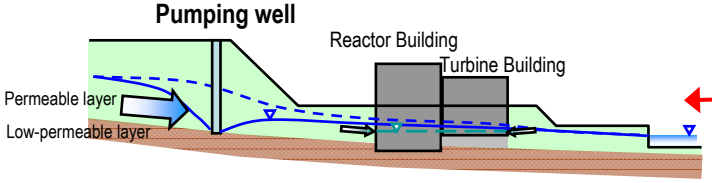
Installation status of multi-nuclide removal equipment

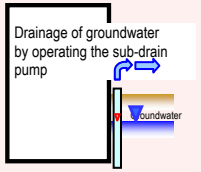
- To limit the density of radioactive materials included in accumulated water within the site and reduce any risk of leaks, multi-nuclide removal equipment has been installed.
- Hot tests using water, which includes radioactive materials, were sequentially commenced (System A: from March 30, 2013, System B: from June 13, 2013, System C: from September 27, 2013).
- For System A, from January 24, as a response to the detection of four radioactive multi-nuclides such as iodine 129 (excluding tritium) in the treated water, a demonstration test of performance improvement measures using activated carbon adsorbent is underway.
- System B has been suspended since January 24 to verify the effectiveness of anti-corrosion measures.
- As for System C, treatment operation continues.

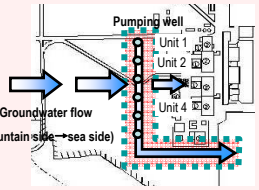


Decontamination performance improvement test with actual equipment

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 groundwater inflow (groundwater bypass) have been implemented.
The groundwater quality has been checked and evaluated to confirm that the radioactive density remains at an appropriately low level compared to rivers around the power station.
Pumped groundwater is temporarily stored in tanks and appropriately operated.
Installation of 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.

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

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

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

Areas where a full-face mask need not be worn were expanded

Operation based on the rules for mask wearing according to airborne radioactive material density and decontamination/ ionization rules was defined, and the area is being expanding from May 30, 2013 (from May 30, 2013: orange area, from October 7, 2013: inside Units 5 and 6, from November 11, 2013: green area).
For works within these areas, disposable masks (N95, DS2) can be worn except for works in high density dust. Surgical masks can also be worn around the main gate and the entry control facility.

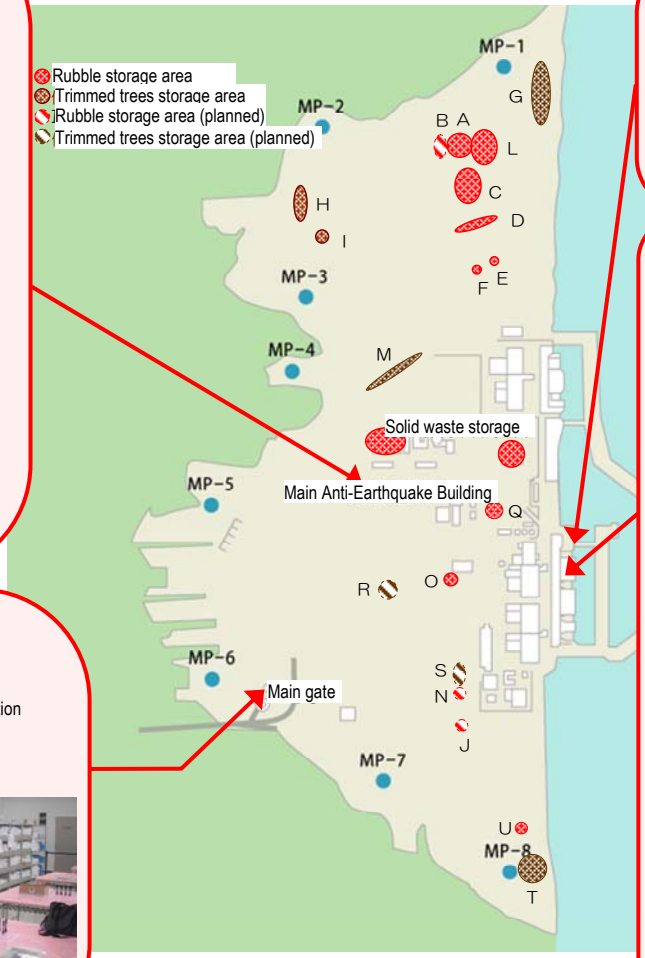
Area where full-face mask need not be worn

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.

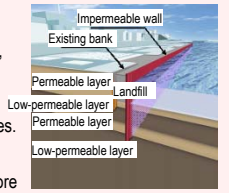
External view of the entrance control facility

Inside the entrance control facility



Installation of impermeable walls

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.



Impermeable wall (image)

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 in mid-March; between Units 2 and 3: Commenced from October 1, 2013 and scheduled for completion late March; between Units 3 and 4: Commenced from October 19, 2013 and scheduled for completion late March)
・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 at the end of March)