

# Progress Status of Mid-and-long-Term Roadmap towards the Decommissioning of Fukushima Daiichi Nuclear Power Unit 1-4, TEPCO etc. (Digest Version)

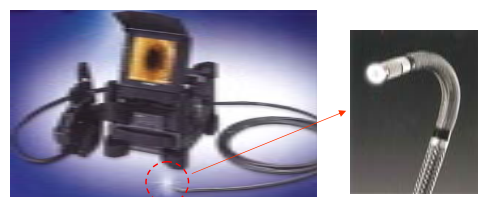
## 1. Progress Summary

- Unit 1~3's condition equal to cold shutdown is maintained at temperatures below 100 degrees Celsius at the RPV bottom and the PCV inside (approx. 25~65 degrees as of Jan. 22.)
- In order to ensure the continuous monitoring of the condition equal to cold shutdown, an industrial endoscope was used to measure the PCV inside temperature at Unit 2.
- The sub-drain purification test and multi-nuclide removal facility design, etc. are under consideration in order to manage the accumulated water from the mid and long term point of view.
- In order to reinforce the circulating water cooling system, measures such as preparing an additional water source for the condensate storage tanks are ongoing.
- Prior to installing sea side water shielding walls, clearing obstacles from the water intake channel in front of Unit 1~4 is ongoing.

## 2. Summary of the Past One Month and Future Plans

### 1) Plans to Maintain Plant's Cold Shutdown Conditions

- Internal PCV inspection at Unit 2  
 In order to ensure continuous monitoring of cold shutdown conditions via grasping the PCV inside state as well as the direct data sampling (PCV inside temperature and water level), the condition and temperature inside the PCV were confirmed via inserting an industrial endoscope and thermocouples through a hole at a penetration point which was drilled prior to the work (refer to Fig.1, 2.)
- Reinforcements of circulating water cooling system  
 Heat insulating materials have been installed in the circulating water cooling system as an anti-freezing countermeasure. In addition, polyethylene piping is being laid on the reactor water injection line in order to enhance durability.  
 Further, while considering the future scale down of the circulation loop, Unit 3's condensate storage tank has been verified in order to allow it to be an additional water source for reactor water injections (scheduled on Jan. 5~ 21.)
- Mitigation of underground water flow into reactor buildings  
 The sub-drain pit purification test is ongoing in order to lower the water level of the sub-drain pit, thus aiming to mitigate underground water flow into the reactor building which would bring about accumulated water increase (Jan. 10~.)
- Consideration and design of multi-nuclide removal facilities  
 The installation of multi-nuclide removal facilities are considered in order to further lower the radioactivity concentration in the processed water of the existing water processing facilities. Currently, a fundamental test is implemented; removal performance of radioactive materials is under review using test equipment.



<Main Specifications>	
External Diameter of Insertion	Φ8.5 mm
Effective Length of Insertion	10 m (insertion length inside PCV: approx. 2m)
Useable Temperature Range of the Insertion	-100 degrees (in Air) , -30 degrees (in Water)
Radiation Durability	1000Gy

Fig.1 Industrial endoscope outline



PCV Internal Wall

Fig.2 Internal PCV appearance

Grating  
(OP. 9500)

### 2) Plan to Reduce Radiation Dose at the Whole Site and Mitigate Contamination

- Seaside water shielding wall installation  
 Prior to installing seaside water shielding walls, clearing obstacles from the front of Unit 1~4's water intake channel such as rubble on the seafloor will be ongoing (scheduled on Jan. 13~ early Feb.).
- Additional countermeasures for mitigating contamination
  - Silt fences will be added to the Unit 5&6' side (scheduled on early Feb.)
  - Covering and solidifying the seabed soil in front of the intake channel will be scheduled (early Feb. ~ late Apr.). Currently, a combination test of solidifying soil as well as a work method review will be ongoing.
- Operation of seawater circulation purification apparatus  
 Operation of seawater circulation purification apparatus will be on going in front of Unit1~4's water intake channel (refer to Fig .4.)
- Installation and operation of PCV gas controlling system  
 This system can extract and control the gas inside the PCV in order to reduce the amount of radioactive material emissions from the PCV. The operation began on Dec. 19 at Unit 1 and Unit 2 is on operation. Installation work of equipment and piping at Unit 3 is on going (operation start is scheduled on late Feb.).
- Effective radiation dose at site boundaries  
 A management and storage method of the radioactive waste is under consideration. The target is to have the effective radiation dose decreased to below 1 mSv/y at the site boundaries due to additional emissions from the whole plant as well as post-accident generated radioactive waste stored in the site (e.g. secondary waste via water processing and rubble) by within FY 2012.
- Systematic onsite decontamination
  - Dosage reduction at the parking lot in front of the Main Anti-earthquake Building (scheduled on Jan. 5~ Feb. 10.)
  - Setting priorities on decontamination areas, and considering decontamination methods (scheduled on early Feb. ~ Mar.).

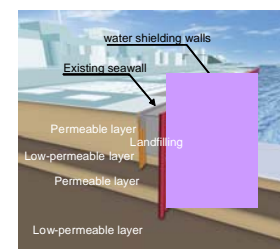


Fig. 3 Water shielding walls (image)

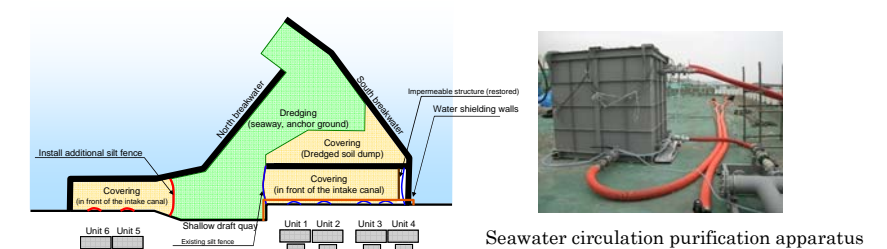


Fig. 4 Covering seabed soil in the port, etc. (Image)

### 3) Plan to Remove Fuels from Spent Fuel Pools

- Rubble removal from the upper part of the reactor buildings of Unit 3 and 4  
 Prior to installing covers for removing fuels, removal of the rubble from the upper part of the reactor buildings at Unit 3 and 4 is ongoing.
- Common pool restoration  
 Restoration of common pool in order to store the fuels removed from the SFPs is ongoing. Temporally restoration of power is by Apr., restoration of utilities by Mar. and overhead crane by Jan.

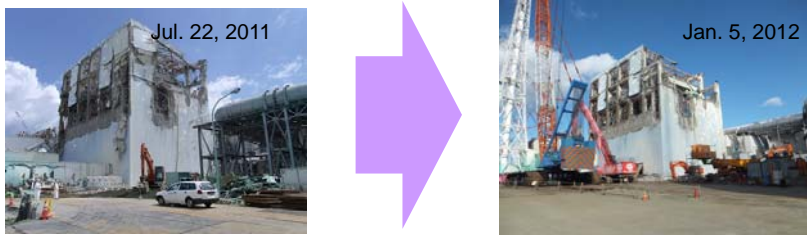


Fig. 5 Rubble clearing at the upper part of the Unit 4 reactor building

#### 4) Fuel Debris Removal Plan

- Decontamination inside the buildings  
Development of remote automation equipment to investigate the contamination status is under consideration.
- Investigation and repair of PCV leakage parts  
Investigation and repair method of the leakage parts are under consideration.
- Fuel Debris Removal  
R&D plan for inside investigation is under consideration.
- Maintain of RPV and PCV soundness  
Analysis conditions for a soundness assessment are under consideration.

#### 5) Plan for Reactor Facilities Demolition and Radioactive Waste Processing & Disposal

- Treatment & disposal of secondary waste generated by contaminated water processing
  - Various characteristic tests for the long-term storage of the secondary waste from processing facilities are ongoing.
  - Samples of both the radioactive accumulated water and the processing facility outlet water have been delivered to JAEA, and the radioactivity concentration of them are under analysis (Jan. 19~.)

#### 6) Organization and Staff Planning

- Staff management
  - Necessary staff is expected to be secured for the work on January & February.
  - Personnel rotation is smooth, taking both the exposure dose and onsite work quality into consideration. (TEPCO staff record: 94 employees have been transferred from October to date.)
  - Local employment rate is 61% at this point (partner companies' staff record.)
- Work & living environment improvements
  - Improvement plan, following discussions with partner companies in light of the fact that there is room to improve the meals in the living environment and the comprehensive work environment such as offices and the onsite work environment, will be considered.

#### 7) Plan to Secure Worker Safety

- Improvement of restrictions on protective equipment requirements
  - Condition ordering and operation manner of allowing personnel to transfer without wearing a Tyvek while shifting locations onsite are under consideration.
  - Changing the full-face mask filter (charcoal filter -> dust filter) is under consideration.
- Helicopter transportation of injured persons  
Transportation training of sick or injured persons was conducted at Fukushima Daini NPS's

helicopter using a helicopter provided by TEPCO's group company. Verification of the safety during landing & taking off and environmental measurements were conducted, and those records were provided to the company that operates the helicopter.

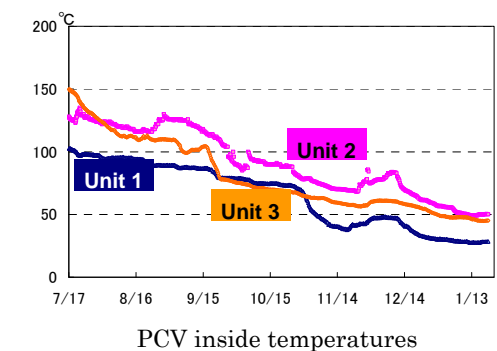
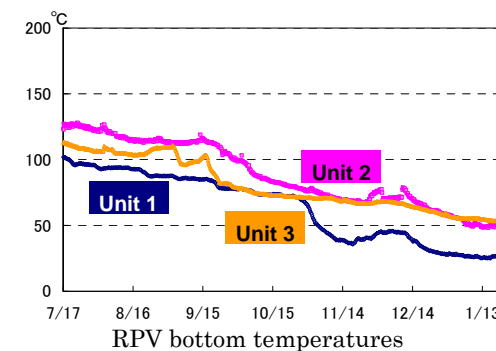
- Full face mask removal in an emergency  
The rule that a full face mask can be removed when first aid treatment is being applied to sick persons was reiterated (Jan. 10.)
- Making the Main Anti-earthquake Building a radiation non-controlled area  
Dosage reduction measures are implemented as planned in order to make the Main Anti-earthquake Building a non-controlled area (cleaning the roof-top and laying iron plates, remodeling floors using lead, etc.)

End

#### (Reference) Plant Status

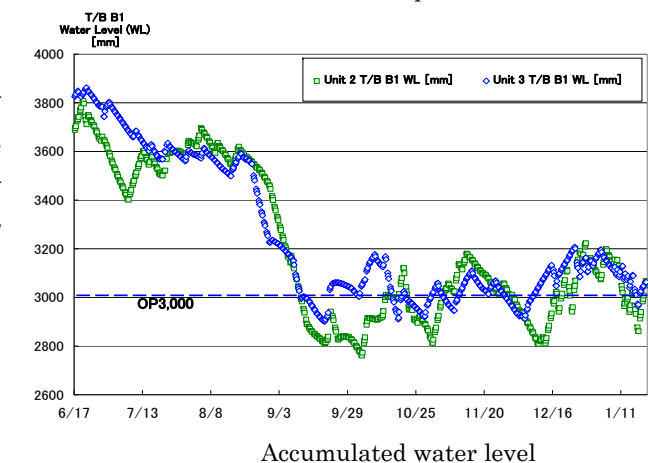
##### 1) Plant data

- Unit 1~3's condition equal to cold shutdown is maintained at temperatures below 100 degrees at RPV bottoms and PCV insides (approx. 25~65 degrees as of Jan. 22.)



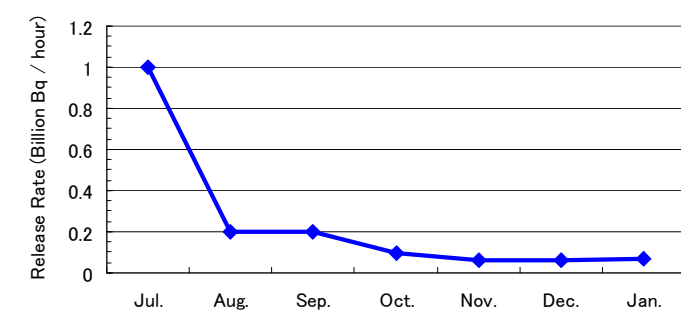
##### 2) Trend of the amount of accumulated water

- Total amount of the accumulated water level has been decreased to the tentative target level of O.P. 3000 during STEP 2 under stable operations of the processing facility afterward.



##### 3) Additional current release of radioactive materials from PCVs (provisional)

- Current release rate of radioactive materials (Cesium) from PCVs of Unit 1~3 has been estimated based on the radioactivity concentration (dust concentration) at the upper part of the reactor buildings, etc.
- The current release rate from Unit 1~3 based on the assessment is estimated to be approx. 0.07 billion Bq/h at the maximum, which is 1/11,000,000 of the release rate at the time of the accident.



Release rate of radioactive materials from PCVs of Unit 1~3's at the time of assessment