

**Status of countermeasures for restoring from the accident at Fukushima Daiichi Unit 1 through 4. As of July 6th, 2011. (Estimated by JAIF)**




		Unit 1	Unit 2	Unit 3	Unit 4	Notes		
Basic information	Type of plant	BWR-3	BWR-4	BWR-4	BWR-4			
	Electric / Thermal power output	460/1380	784/2381	784/2381	784/2381			
Plant status when hit by the earthquake	Operation status	In service -> Shutdown	In service -> Shutdown	In service -> Shutdown	Outage			
	No. of nuclear fuels loaded in the reactor	400	548	548	0			
	No. of spent fuels stored in the SFP	292	587	514	1331			
	External power supply	Stopped due to the earthquake						
	Emergency power supply	EDGs automatically started up when the external power was lost but stopped later when tsunami hit the plants.						
Reactor cooling	Status	Core and fuel integrity	Damaged (core melt*1)	Damaged (core melt*1)	Damaged (core melt*1)	No fuels loaded		
	measures	RPV structural integrity	Limited damage and leakage	Unknown	Unknown	No damage		
		PCV structural integrity	Damage and leakage suspected	Damage and leakage suspected	Damage and leakage suspected	No damage		
		Core cooling	Not functional	Not functional	Not functional	Not required		
		Goal of STEP 1 (April through July)	Stable cooling (circulating injection cooling reusing accumulated water)					
		Cooling by minimum injection rate	Injecting freshwater into the reactor via feed water line at 3.8 m3/h [7/5]	Injecting freshwater into the reactor via feed water line at 3.5 m3/h [7/5]	Injecting freshwater into the reactor via feed water line at 8.9 m3/h [7/5]	—	Decreasing the injection rate to prevent the overflow of the accumulated water in the facilities	
		Establishment of circulating injection cooling	Injection line established. Circulation started [6/27-] following the radioactive water process facility starts its operation.					
	Challenge	Nitrogen gas injection into PCV	Injection continued [4/6-]	Injection continued [6/28-]	Work for injection line in progress [4/16-]	—		
		Flooding of PCV after sealing leaks	Studying	Studying	Studying	—		
		Securing heat exchange function	Work for secondary-loop piping in progress (5/13-)	Construction work to be started after improving the work environment	Construction work to be started after improving the work environment	—		
Improving work environment		High radiation circumstance is hampering the work to restore reactor cooling. Preparation work such as removing radioactive debris, radiation monitoring is underway in each unit. Large-scale work inside the R/B started at unit-1 and 2 after radioactive substance and humidity in the air inside the R/B dropped.						
SFP cooling	Status	Fuel integrity in SFP	Unknown	Most spent fuels not damaged*2	Unknown	Most spent fuels not damaged*2		
	measures	SFP cooling	Injection function recovered	Function recovered	Injection function recovered	Not functional		
		Goal of STEP 1 (April through July)	Stable cooling					
		Reliability improvement in injection operation	Injecting freshwater via SFP coolant clean up line	Switching from freshwater injection via SFP coolant clean up line to circulation cooling	Injecting freshwater via SFP coolant clean up line. Bolic acid added to neutralize the alkalized pool water [6/26,27]	Injecting freshwater via alternative injection line. Preparing system for cooling in a stable manner	Injecting corrosion inhibitor, hydrazine (H2NNH2), with freshwater [5/9-]	
Accumulated water	measures	Circulation cooling with Hx	Planned	In operation [5/31-]	In operation [6/30-]	Planned		
		Status	Increase and accumulation of radioactively contaminated water	High level radioactive wastewater is accumulating in the R/B, T/B and RW/B of each unit. (about 99,440m3 [6/28])				
		Goal of STEP 1 (April through July)	Securing storage place of high level radioactive wastewater					
	Challenge	Securing storage place	-Storage capacity of 14800m3 (10,000m3 + 4,800m3) for highly radioactive wastewater are secured by using the Centralized Radiation Waste Treatment Facility as water storage place. -Underground tank for high level radioactive wastewater (storage capacity: approx. 10,000m3) to be installed in the mid August -Storage tanks to receive processed, low to middle level radioactive wastewater with the capacity of approx. 13,000m3 installed (-5/31). Additional capacity to be installed at 20,000m3/month from the end of June.				PMB: Process Main Building MWRTB: Miscellaneous Solid Waste Volume Reduction Treatment Building	
		Transfer of radioactive waste water	Highly radioactive wastewater in Unit 2 and unit 3 has been translated the Centralized Radiation Waste Treatment Facility since April 19.					
		Installation of water process facility	-Highly radioactive wastewater treatment system for recycling water that has processing capacity of 1,200m3/day is working on a trial basis. Reuse of the processed water, which was decontaminated and desalinated through the system, started for reactor cooling [6/27-].					
		Preventing contamination of the sea, etc.	-Silt fences installed. -Seawater circulatory purification system goes into full-scale operation. [6/13] -Blocking the concrete tunnels outside the T/Bs completed [6/10], etc.					
measures	Preventing overflow of high level radioactive waste water	Highly radioactive wastewater treatment system should be operated in stable and effective manner to prevent wastewater accumulated in unit-2 and 3 overflowing.						
	Goal of STEP 1 (April through July)	Storing and processing low level radioactive wastewater						
Underground water	measures	Increasing storage capacity	18,400 tons (2,200 + 6,200 + 10,000) of tanks installed. 10,000 tons of Mega-Float prepared. 2,000 tons of receiving capacity to be secured.					
		Status	Radioactive materials in the ground water	Radioactive iodine, I-131, cesium, Cs-134, 137, and Sr-89, 90 were detected from the subdrain, underground water collected and controlled in the facility, and the well water in the Fukushima Daiichi site. [4/7-]				
Radioactive materials in the atmosphere / soil	measures	Goal of STEP 1 (April through July)	Preventing contaminated underground water from spreading to the sea					
		Mitigation of groundwater contamination	Pumps for correcting underground water called "subdrain" is to be restored in the middle of June. Subdrain is to be treated in accordance with the contaminated water management plan. Construction of wall for underground water isolation is under consideration.					
	Status	Scattering of radioactive materials to the outside of the facilities	Radioactive materials and radioactively contaminated debris scattered due to the hydrogen explosion at Unit 1 and 3 R/Bs and other events.				Survey map on the site: <a href="http://www.tepco.co.jp/en/nu/fukushima-np/f1/index3-e.html">http://www.tepco.co.jp/en/nu/fukushima-np/f1/index3-e.html</a>	
		R/B integrity	Severely damaged	Partly opened	Severely damaged	Severely damaged		
Tsunami, etc.	measures	Goal of STEP 1 (April through July)	Preventing scattering of radioactive materials in the facilities and the site					
		Dispersion of inhibitor	Dispersion to the outside of buildings in progress [full operation from 4/26-] Dispersion to the R/Bs and T/Bs [5/27-]					
		Removal of debris	Removal of debris using remote-controlled heavy machine in progress [4/10-]					
Plant parameters	Reactor	Installing R/B cover	Preparation work in progress [5/13-] Installation work of the cover started [6/28-]	—	Designing	Planning		
		Goal of STEP 1 (April through July)	Enhancement of countermeasures against aftershocks, etc.					
		Countermeasures against tsunami	-Transferring emergency power sources to the upland [4/15] -Addition of redundant water injection line [-4/15] -Setting fire trucks etc. to the upland [-4/18] -Installing a temporary tide barriers [-6/30]					
		Planning and implementation of reinforcement work of each unit	-Work for installing supporting structure under the bottom of the Unit 4 SFP in progress. Steel pillars installed [6/7-6/20]. Work to be completed by filling concrete and grout by the end of July. -Soundness of structure analysis and evaluation for each unit in progress. Seismic safety confirmed for Unit 1 and 4 [5/28]					
	PCV	Various radiation shielding	Pipe work completed, pumping vehicle set [5/17]					
		Reactor water level (mm) [7/5 11:00]	A: Below the lower end of gauge, B: -1650**, Mostly steady	A: -1850, B: -2150 Mostly steady**	A: -1750, B: -2250 Mostly steady**	—	■ 'A', 'B' shows the group of the redundant instruments	
	Pool	Reactor pressure (MPa) [7/5 11:00]	A: 0.037, B: -, Mostly steady Measured with temporary pressure indicator [6/4-]	A: 0.029, B: - Mostly steady**	A: -0.166, B: -0.104 Mostly steady**	—	■ Reactor water level monitors to be calibrated. Unit 1 Ch.A done [5/11] Unit 2 Ch.A now being calibrated [6/22-]	
		RPV temperature at feedwater nozzle (°C) [7/5 11:00]	117.2 Mostly steady	112.3 Mostly steady	151.0 Mostly steady	—	■ Primary parameters' trend is available at JANTI's HP: <a href="http://www.gengikyo.jp/english/shokai/special_4.html">http://www.gengikyo.jp/english/shokai/special_4.html</a> **Continuously monitoring the status	
	High level accumulated water	RPV temperature at the bottom of the vessel (°C) [7/5 11:00]	102.2 Mostly steady	121.3 Mostly steady	120.7 Mostly steady	—		
		Pressure of drywell (MPa) [7/5 11:00]	0.1428 Mostly steady	0.020 Mostly steady**	0.0985 Mostly steady	—		
Pressure of suppression pool (MPa) [7/5 11:00]		0.125 Mostly steady	Below the lower end of gauge Instrument failure	0.1818 Mostly steady	—			
Water temperature of SFP		Instrument failure	35.0°C [7/5 11:00]	32.4°C [7/5 11:00]	85-87°C [7/4 18:20]			
Environmental effect in the vicinity of the station	measures	Stored volume [6/28]	17,240m3 [6/28]	27,600m3 [6/28]	31,000m3 [6/28]	23,600m3 [6/28]		
		Water level in T/B [6/28]	OP.4,969	OP.3,648	OP.3,744	OP.3,755	OP.: Onahama port construction datum level Near-term target: OP. 3,000*4	
		Total stored volume [6/28]	99,440m3 (Approx. 121,000m3 including the wastewater transferred to the Centralized Radiation Waste Treatment Facility)					
		Total volume of processed water	Approx. 13,000m3 [6/17-7/4] (Approx. 5,000m3 desalinated [-7/5])					
Radiation exposure of the workers	measures	Air dose rate: 5-113 μSv/h at the NPS border (Monitoring Post), 339 μSv/h at the south side of the office building, 34 μSv/h at the main gate, 13 μSv/h at the wet gate [7/6 09:00]	-Air dose rate: 5-113 μSv/h at the NPS border (Monitoring Post), 339 μSv/h at the south side of the office building, 34 μSv/h at the main gate, 13 μSv/h at the wet gate [7/6 09:00]				Air dose rate: <a href="http://www.tepco.co.jp/en/nu/fukushima-np/f1/index-e.html">http://www.tepco.co.jp/en/nu/fukushima-np/f1/index-e.html</a> Air, seawater, underground water soil, etc.: <a href="http://www.tepco.co.jp/en/nu/fukushima-np/f1/index2-e.html">http://www.tepco.co.jp/en/nu/fukushima-np/f1/index2-e.html</a>	
		Radioactive materials have been detected in samples collected from underground water and also seawater at or near the site. Environmental monitoring has been enhanced [4/16-]. Sr-89, 90 exceeding the regulatory limit have been detected from the seawater sampled on 5/16 near the seawater intake.	Radioactive materials have been detected in samples collected from underground water and also seawater at or near the site. Environmental monitoring has been enhanced [4/16-]. Sr-89, 90 exceeding the regulatory limit have been detected from the seawater sampled on 5/16 near the seawater intake.					
Radiation exposure of the workers	measures	TEPCO is examining some 3,700 workers who have worked at the plant since March 11th for exposure to radiation. Of that number, 3,514 have undergone provisional medical checkups. (100-200mSv: 107 workers, 200-250mSv: 8 workers, 250mSv-: 9 workers) Detailed assessment concluded that 7 workers had received more than 250mSv, two numbers less than in the provisional one. [6/30]. Amount of doses that the 2 workers who received most are 643mSv and 678mSv. [6/20]. Out of some 4,300 workers, who worked in April, excluding those who had worked in March, 2,342 workers have undergone medical checkups. It turned out that one worker had received radiation dose above 100mSv. *The allowable emergency limit for radiation doses: 250 millisieverts	TEPCO is examining some 3,700 workers who have worked at the plant since March 11th for exposure to radiation. Of that number, 3,514 have undergone provisional medical checkups. (100-200mSv: 107 workers, 200-250mSv: 8 workers, 250mSv-: 9 workers) Detailed assessment concluded that 7 workers had received more than 250mSv, two numbers less than in the provisional one. [6/30]. Amount of doses that the 2 workers who received most are 643mSv and 678mSv. [6/20]. Out of some 4,300 workers, who worked in April, excluding those who had worked in March, 2,342 workers have undergone medical checkups. It turned out that one worker had received radiation dose above 100mSv. *The allowable emergency limit for radiation doses: 250 millisieverts					

- \*1 TEPCO's analysis [announced on 5/15]
- \*2 TEPCO judged that most spent fuels were not damaged in the Unit 2 and 4 SFPs based on the detailed analysis of the radioactive materials in the pool water. [5/31]
- \*3 Rough estimate by TEPCO [announced on 5/31]
- \*4 TEPCO set the target so as to reduce the risk of the discharge of the overflowed water into the sea and the leak to the underground water.


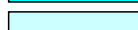
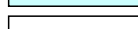
[Source]

Government Nuclear Emergency Response Headquarters: News Release,  
 Press conference  
 NISA: News Release, Press conference  
 TEPCO: Press Release, Press Conference

[Significance judged by JAIF]

 :Low  
 :High  
 :Severe (Need immediate action)

[Progress of countermeasures]

 :Completed  
 :Under construction  
 :To be done (including studying and manufacturing)

[Abbreviations]

SFP: Spent Fuel Storage Pool  
 EDG: Emergency Diesel Generator  
 RPV: Reactor Pressure Vessel  
 PCV: Primary Containment Vessel  
 R/B: Reactor Building  
 T/B: Turbine Building  
 RW/B: Radioactive Waste Disposal Building  
 RHR: Residual Heat Removal system  
 CST: Condensate water Storage Tank  
 Hx: Heat exchanger  
 NPS: Nuclear power station