

Status of countermeasures for restoring from the accident at Fukushima Daiich Unit 1 through 4. As of July 10th, 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.				
Current status of the plant and the progress of countermeasures taken	Reactor cooling	Status				
		Core and fuel integrity	Damaged (core melt*1)	Damaged (core melt*1)	Damaged (core melt*1)	No fuels loaded
		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
		measures				
		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 <u>3.5 m3/h</u> [7/9]	Injecting freshwater into the reactor via feed water line at <u>3.4 m3/h</u> [7/9]	Injecting freshwater into the reactor via feed water line at <u>9.0 m3/h</u> [7/9]	—
		Establishment of circulating injection cooling	Injection line established. Circulation started[6/27-] following the radioactive water process facility starts its operation.			—
		Nitrogen gas injection into PCV	Injection continued [4/6-]	Injection continued [6/28-]	Work for injection line in progress [4/16-]	—
	SFP cooling	Challenge				
		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.			—
		Status				
		Fuel integrity in SFP	Unknown	Most spent fuels not damaged*2	Unknown	Most spent fuels not damaged*2
		SFP cooling	Injection function recovered	Function recovered	Function recovered	Not functional
		measures				
		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 tentative injection line, <u>Work to establish a cooling system via water circulation continues</u>
		Circulation cooling with Hx	Planned	In operation [5/31-]	In operation [6/30-]	<u>Construction to be prepared.</u>
	Accumulated water	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])			
		measures				
		Goal of STEP 1 (April through July)	Securing storage place of high level radioactive wastewater			
		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	<u>-Highly radioactive wastewater treatment system installed on June 27 is now working on a full-scale basis. (Capacity 1200m3/day)</u> <u>Water processed with the treatment system has been injected to the cores for cooling since June 27.</u>			
		Preventing contamination of the sea, etc.	<u>-Silt fences installed. -Seawater circulatory purification system goes into full-scale operation. [6/13]</u> <u>-Blocking the concrete tunnels outside the T/Bs completed [6/10], etc.</u>			
		Challenge				
		Preventing overflow of high level radioactive waste water	Highly radioactive wastewater treatment system should be operated in stable and effective manner to prevent wastewater overflowing to the environment.			
	Undergro-und water	measi				
		Goal of STEP 1 (April through July)	Storing and processing low level radioactive wastewater			
		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-]			
		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.			
	Radioactive materials in the atmosphere / soil	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: http://www.tepco.co.jp/en/nu/fukushima-np/f1/index3-e.html
		R/B integrity	Severely damaged	Partly opened	Severely damaged	Severely damaged
		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-]			
		Installing R/B cover	Preparation work in progress [5/13-] Installation work of the cover started [6/28-]	—	Designing	Planning
	Tsunami, reinforcement, etc.	measures				
		Goal of STEP 1 (April through July)	Enhancement of countermeasures against aftershocks, etc.			
		Countermeasures against tsunami	<u>-Transferring emergency power sources to the upland [4/15] -Addition of redundant water injection line [-4/15]</u> <u>-Setting fire trucks etc. to the upland [-4/18] -Installing a temporary tide barriers [-6/30]</u>			
		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. -The structural assessment for each unit is in progress. Enough seismic capacity was confirmed for Unit 1 and 4 [5/28]			
		Various radiation shielding	Pipe work completed, pumping vehicle set [5/17]			
Plant parameters	Reactor	Reactor water level (mm) [7/9 11:00]	A: Below the lower end of gauge, B: <u>-1650**</u> , Mostly steady	A: <u>-1850</u> , B: <u>-2150</u> Mostly steady**	A: <u>-1950</u> , B: <u>-2250</u> Mostly steady**	—
		Reactor pressure (MPa) [7/9 11:00]	A: <u>0.037</u> , B: -, Mostly steady Measured with temporary pressure indicator [6/4-]	A: <u>0.026</u> , B: - Mostly steady	A: <u>-0.164</u> , B: <u>-0.106</u> Mostly steady**	—
		RPV temperature at feedwater nozzle (℃) [7/9 11:00]	<u>117.3</u> Mostly steady	<u>112.2</u> Mostly steady	<u>151.9</u> <u>Mostlv steady</u>	—
		RPV temperature at the bottom of the vessel (℃) [7/9 11:00]	<u>102.6</u> Mostly steady	<u>120.4</u> Mostly steady	<u>125.0</u> <u>Mostlv steady</u>	—
	PCV	Pressure of drywell (MPa) [7/9 11:00]	<u>0.1441</u> Mostly steady	<u>0.020</u> <u>Mostlv steady**</u>	<u>0.0998</u> Mostly steady	—
		Pressure of suppression pool (MPa) [7/9 11:00]	<u>0.125</u> Mostly steady	Below the lower end of gauge Instrument failure	<u>0.1832</u> Mostly steady	—
	Pool	Water temperature of SFP	Instrument failure	<u>34.0℃</u> [7/9 11:00]	<u>32.2℃</u> [7/9 11:00]	<u>82℃</u> [7/8 16:00]
	High level accumulated water	Stored volume[7/5]	17,010m3	26,400m3	30,900m3	23,300m3
		Water level in T/B[7/5]	OP.4,960	OP.3,459	OP.3,723	OP.3,734
		Total stored volume[7/5]	97,610m3 (Approx. 119,460m3 including the wastewater transferred to the Centralized Radiation Waste Treatment Facility)			
		Total volume of processed water	Approx. 13,610m3 [6/17-7/5] (Approx. 5,500m3 desalinated [-7/5])			
	Environmental effect in the vicinity of the station		-Air dose rate: <u>5-114 μ Sv/h</u> at the NPS border (Monitoring Post), <u>337 μ Sv/h</u> at the south side of the office building, <u>34 μ Sv/h at the main gate, 13 μ Sv/h</u> at the wet gate [7/10 10:00] -Some radioactive materials (I, Cs, Pu, Am Cm and Sr) has been detected in the soil sampled at the site. 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.			Air dose rate: http://www.tepco.co.jp/en/nu/fukushima-np/f1/index-e.html Air, seawater, underground water soil, etc.: http://www.tepco.co.jp/en/nu/fukushima-np/f1/index2-e.html
	Radiation exposure of the workers		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 of 8 workers out of the 9 with the provisional exposure doses over 250mSv have been done, showing that 6 workers had received more than 250mSv.[7/7] The doses of the 8 workers are distributed from 309 to 678mSv. 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 5/15s
- *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]	[Significance judged by JAIF]	[Progress of countermeasures]
Government Nuclear Emergency Response Headquarters: News Release,	:Low	: Completed
Press conference	:High	: Under construction
NISA: News Release, Press conference		
TEPCO: Press Release, Press Conference		

[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