Overview of the status of countermeasures at Fukushima Daiichi Unit 1-4 (Sep. 29th-Oct. 6th Refer to the attached table for details of ①-⑤)

⑤Radioactive materials in the atmosphere / soil

【Goal】Mitigation of dispersion of radioactive materials

【Status】The release rate of radioactive materials from the facilities is declining (the release rate at the end of July was estimated to be one fifth of the one of the end of June)

【The latest challenge & action】Installing a cover over the highly damaged reactor building to prevent further release of radioactive materials. (Under construction at Unit 1, Being designed at Unit 3 and 4.

Planning to install a facility to maintain the PCV pressure at around atmospheric one so as to reduce the leak of radioactive materials from the vessel after RPV bottom temperatures going down below 100℃.

②Spent Fuel Pool cooling（Unit 1 - 4）

【Goal】More stable cooling (achieved)

【 Status 】 Circulation cooling with heat exchanger in progress

【The latest challenge & action】Desalination of the pool water in progress unit by unit

③Accumulated water

【Goal】Reduction of total amount of contaminated water

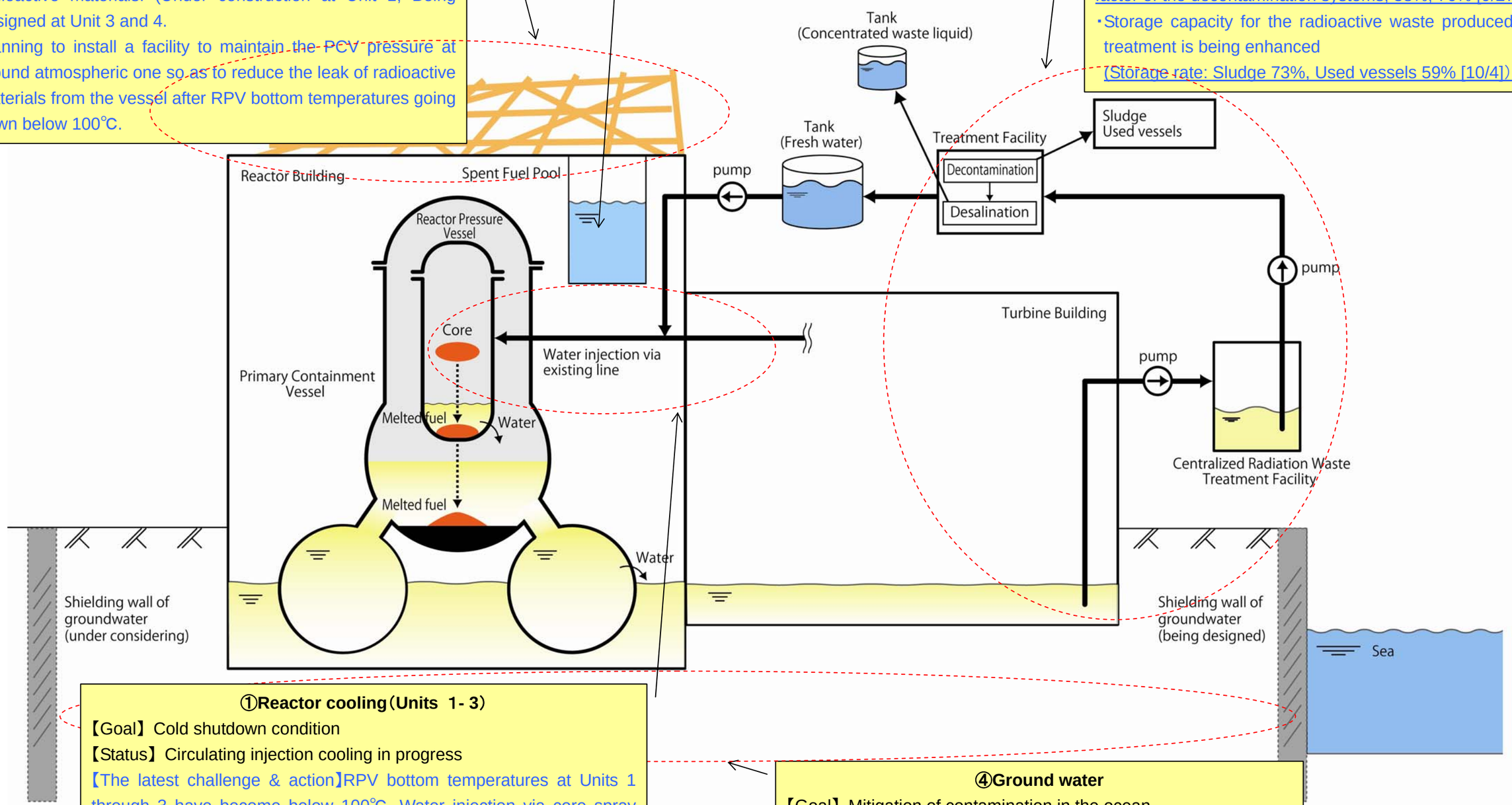
【Status】Treatment of high level radioactive wastewater (Approx. 79,880m3 [10/4]) in progress

【The latest challenge & action】

・Water treatment facility is being enhanced. The challenge is to operate the treatment facility stably and effectively. (Capacity factor of the decontamination systems; 38%, 76% [9/27-10/4])

・Storage capacity for the radioactive waste produced by water treatment is being enhanced

(Storage rate: Sludge 73%, Used vessels 59% [10/4])



①Reactor cooling（Units 1- 3）

【Goal】Cold shutdown condition

【Status】Circulating injection cooling in progress

【The latest challenge & action】RPV bottom temperatures at Units 1 through 3 have become below 100℃. Water injection via core spray line, in addition to the feed water line currently used, started at Unit 3 [9/1-] and Unit 2 [9/14-].

④Ground water

【Goal】Mitigation of contamination in the ocean

【Status】Monitoring the radioactive materials in the groundwater

【The latest challenge & action】Shielding wall of groundwater is being designed

Status of countermeasures for restoring from the accident at Fukushima Daiich Unit 1 through 4. As of October 7th, 2011*. (Estimated by JAIF)

*Next update schedule: Oct. 13th, 2011.

			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	Emergency Diesel Generator once had started in response to loss of external power stopped when the tsunami hit these plants.				
Current status of the plant and the progress of countermeasures taken	①Reactor cooling Status	Core and fuel integrity	Damaged (core melt*1)	Damaged (core melt*1)	Damaged (core melt*1)	No fuels loaded	
		RPV structural integrity	Partially damaged and leaking	Unknown	Unknown	No damage	
		PCV structural integrity	Damage and leakage suspected	Damage and leakage suspected	Damage and leakage suspected	No damage	
		Core cooling	Cooling with the alternative system created after the tsunami			Not required	
		Goal of STEP 2 (Jul. through Jan., 2012)	To achieve Cold shutdown condition: 1) Temperature of RPV bottom is, in general, below 100℃, 2) Release of radioactive materials from PCV is under control and public radiation exposure by additional release is being significantly held down			—	"Cold shutdown status" is redefined in the status progress report issued on July 19.
	①Reactor cooling measures	Circulating injection cooling	System in operation [partial operation: 6/27-, full operation: 7/2-]			—	
		Nitrogen gas injection into PCV	Injection continued [4/6-]	Injection continued [6/28-]	Injection started [7/14-]	—	
	①Reactor cooling Challenge	Continuation and enforcement of the circulating injection cooling	**RPV bottom temperatures at Units 1 through 3 have become below 100℃.** Water injection via core spray line, in addition to the feed water line, started at Unit 3 [9/1-] and Unit 2 [9/14-]. The effect of the diversified water injection on the RPV temperature is being comfirmed while adjusting its flow rate.			—	
	②SFP cooling Status	Fuel integrity in SFP	Unknown	Most spent fuels not damaged*2	Unknown	Most spent fuels not damaged*2	
		SFP cooling	Function recovered	Function recovered	Function recovered	Function recovered	
		Goal of STEP 2 (Jul. through Jan., 2012)	More stable cooling: Establishment of circulation cooling with Hx (already achieved at Unit 2 and 3)				
	②SFP cooling measures	Circulation cooling with Hx	Hx newly installed in operation [8/10-]	Hx newly installed in operation [5/31-]	Hx newly installed in operation [6/30-]	Hx newly installed in operation [7/31-]	
		desalting of water in the pool	— (No seawater injected)	Operation of the desalting facility will start after the operation of unit 4.		operation of the desalting facility started[8/20-]	
	③Accumulated 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. (Approx. 79,880m3 [10/4])				
		Goal of STEP 2 (Jul. through Jan., 2012)	Reduction of total amount of contaminated water				
	③Accumulated water measures	Installation of water process facility	-Highly radioactive wastewater treatment system installed on June 17 is now working on a full-scale basis. (Capacity 1200m3/day) -Water processed with this system has been reused for core injection for cooling since June 27.				
		Elimination, continuous processing and system enhancement of accumulated water in the building	-Highly radioactive wastewater in Unit 2 and unit 3 has been transferred to the Centralized Radiation Waste Treatment Facility since April 19. -The cesium adsorption unit No. 2 started operation on August 18. Currently these No.1 and No.2 unit is working in parallel operation mode. -Works for installing additional desalination unit that consists of 8 components is in progress. 5 of them started operation [8/7-, 8/31-]				
		Storage / management of sludge waste etc.	-Sludge waste generated from the high-level radioactive water processing facility has been properly managed. -Facility for storing sludge waste is to be built.				
		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. -Work for installing underground tank for high level radioactive wastewater in progress (2,800m3 installed [9/7]) -Storage tanks to receive processed, low to middle level radioactive wastewater with the capacity of approx. 76,000m3 installed (-9/16). Additional capacity to be installed at about 20,000m3/month				
		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.				
	③Accumulated water 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. **The accumulated water level reached the target level (OP. +3,000). Namely, the level of accumulated water has dropped as low as the leakage or overflow of the water will not happen in the case of heavy rains and long-term processing facility outage [9/11]. TEPCO plans to maintain the current level in the meanwhile.**				
		Goal of STEP 2 (Jul. through Jan., 2012)	Reduction of total amount of contaminated water				
	③Accumulated water measures	Increasing storage capacity Decontaminating radioactive water	-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. -Decontamination with zeolite continued				
	④Ground water 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-]				
		Goal of STEP 2 (Jul. through Jan., 2012)	Mitigation of contamination in the ocean (continuing from Step 1)				
	④Ground water measures	Mitigation of groundwater contamination	Pumps for correcting underground water called "subdrain" have been restored. Subdrain is being treated in accordance with the contaminated water management plan. Shielding wall of groundwater is being designed.				
	⑤Radioactive 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 occurred at Unit 1 and 3 R/Bs and other events. -The release rate of radioactive materials from Unit 1 through 3 as of the early September was estimated to be about 200 million Bq/h (Cs-134 and 137) at maximum. [TEPCO announced on 9/20] -Exposure doses at the site boundary caused by radioactive substance currently being released was estimated to be 0.4 mSv/y at maximum on the assumption of the above release rate. (※Approx. one 4-millionth of the maximum emission rate on 3/15, approx. one 12,500th of the rate for 3/25-26, approx. one 1450th of the rate for 4/4-6, approx. one 5th of the rate for June.)				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	
		Goal of STEP 2 (Jul. through Jan., 2012)	Mitigation of dispersion				
	⑤Radioactive materials in the atmosphere / soil measures	Dispersion of inhibitor	Splaying dispersion inhibitor outside and inside the R/Bs and T/Bs completed				
		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 Preparation work in progress [6/20-]	Designing Preparation work in progress [6/24-]	Covers for Unit 3 and 4 to be installed after Step 2
		Installation of PCV gas control system	Preparation work in progress	Detailed design in progress	Detailed design in progress	—	To be installed after RPV bottom temperatures going down below 100℃
	Tsunami, reinforcement. etc. measures	Goal of STEP 2 (Jul. through Jan., 2012)	Mitigation of further disasters				
		Countermeasures against tsunami	-Relocating emergency power sources to the upland [4/15] -multiplexing injection lines [-4/15] -Deploying fire trucks etc. at the upland [-4/18] -Building temporary tide barriers [-6/30]				
		Planning and implementation of reinforcement work of each unit	Enough seismic capacity confirmed by structural assessment [5/28]	Enough seismic capacity confirmed by structural assessment [8/26]	Enough seismic capacity confirmed by structural assessment [7/13]	-Enough seismic capacity confirmed by structural assessment [5/28] -Installation of supporting structure under the bottom of the pool completed [7/30]	
Plant parameters	Reactor	Reactor injection flow rate(m3/h) [10/6 11:00]	3.8	**3.6 via feed wate line 7.1 via core spray line**	**2.3 via feed wate line 8.1 via core spray line**	—	■"A", "B" shows the group of the redundant instruments ■Reactor water level monitors to be calibrated. Unit 1 Ch.A done.[5/11] Unit 2 Ch.A conducted.[6/22-24] ■Primary parameters' trend is available at JANTI's HP; http://www.gengikyo.jp/english/shokai/special_4.html **Continuously monitoring the status
		Reactor water level (mm) [10/6 11:00]	A:Below the lower end of gauge, B:-1700**, Mostly steady	A:-1800、B:-2200 Mostly steady**	A:-2400、B:-2300 **	—	
		Reactor pressure (MPa) [10/6 11:00]	A:0.013, B:-, Mostly steady Measured with temporary pressure indicator [6/4-]	A:0.008, B:- Mostly steady	A:-0.176、B:-0.123 Mostly steady**	—	
		RPV temperature at feedwater nozzle (℃) [10/6 11:00]	73.5 Slightly going down	**81.9 Going down**	**72.6 Going down**	—	
		RPV temperature at the bottom of the vessel (℃) [10/6 11:00]	75.4 Slightly going down	**90.1 Going down**	**75.2 Going down**	—	
	PCV	Pressure of drywell (MPa) [10/6 11:00]	0.1209 Mostly steady	0.112 Mostly steady	0.1015 Mostly steady	—	
		Pressure of suppression pool (MPa) [10/6 11:00]	0.100 Mostly steady	Below the lower end of gauge Instrument failure	0.1873 Mostly steady	—	
	Pool	Water temperature of SFP [10/6 11:00]	23.0℃	26.0℃	24.4℃	33℃	
	High level accumulated water	Storage volume[10/4]	16,180m3	19,800m3	25,500m3	18,400m3	
		Water level in T/B[10/4]	OP.+4,945mm	**OP.+2,763mm**	**OP.+3,045mm**	**OP.+3,048mm**	OP.: Onahama Bay mean sea level Near-term target: OP. +3,000mm*3
		Total stored volume[10/4]	Approx. 79,880m3 (Approx. 97,810m3 including the wastewater transferred to the Centralized Radiation Waste Treatment Facility)				
		Total volume of processed water [-10/4]	Approx. 114,800 m3 decontaminated (Approx. 46,842m3 desalinated*)				*Just for reference as the reading of level monitor of the desalinated water tank was not stable.
		Waste produced [-10/4]	**Sludge: 581m3 (Storage capacity 800m3), Used vessels: 232 (Storage capacity 393), Concentrated waste liquid: 2,768m3* (Storage capacity 9,500m3)**				
Environmental effect in the vicinity of the station			-Air dose rate: 5-98 μSv/h at the NPS border (Monitoring Post), 298 μSv/h at the south side of the office building, 29 μSv/h at the main gate, 11 μSv/h at the wet gate [10/7 09:00] -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 seawater at or near the site.				
Radiation exposure of the workers			TEPCO has been examining the radiation exposure of about 14,800 workers who worked at the Fukushima Dai-ichi NPS. Intermediate result of this examination as of 9/30 is as follows. 99 workers received more than 100mSv. (100-150mSv: 77 workers, 150-200mSv: 14 workers, 200-250mSv: 2 workers, 250mSv-: 6 workers) Definite exposure doses of 6 workers who received more than 250mSv are distributed from 309 to 678mSv. *The allowable emergency limit for radiation doses: 250mSv				

*1 TEPCO's analysis [announced on 5/15,23]
*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 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