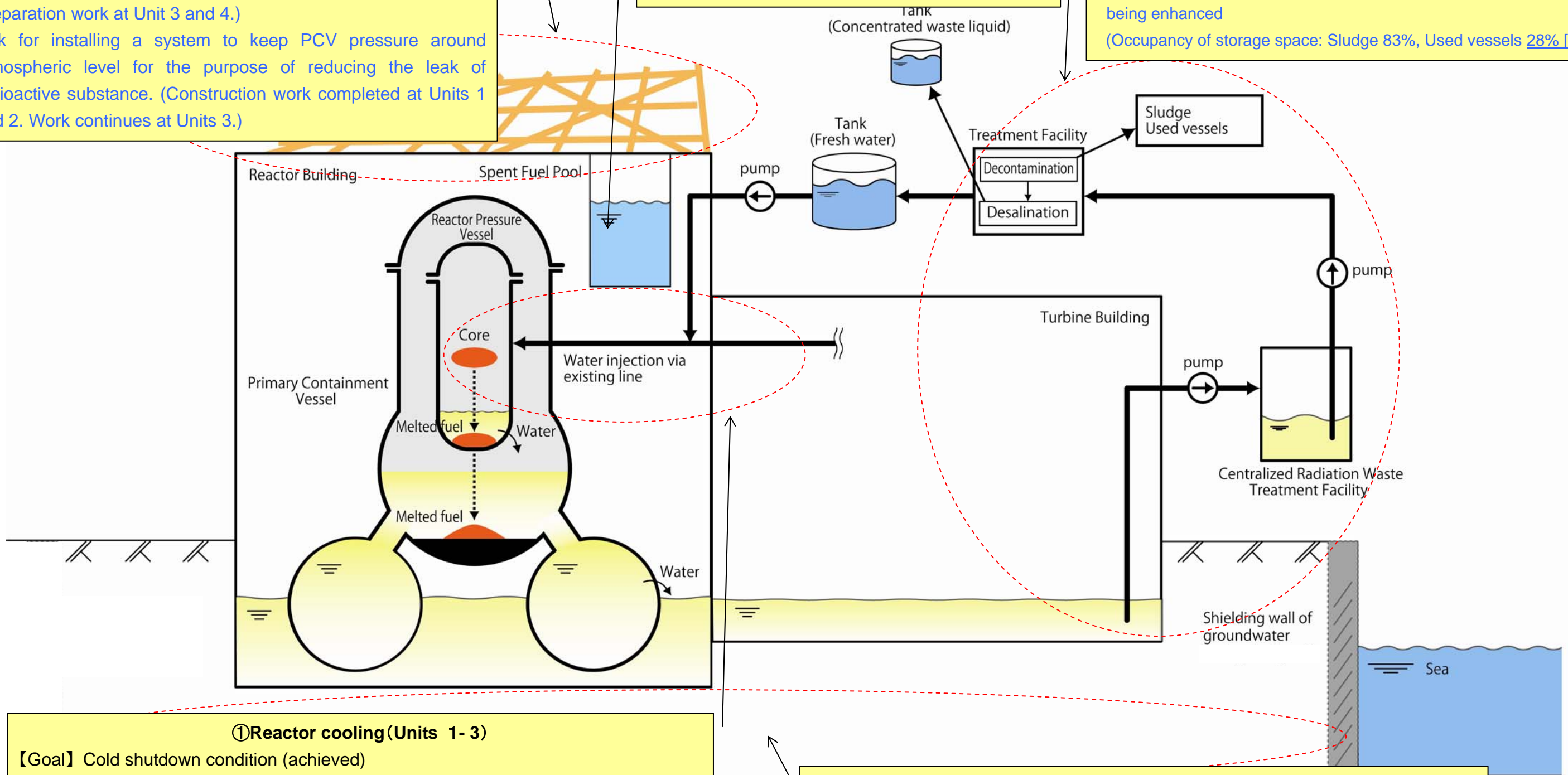


Overview of the status of countermeasures at Fukushima Daiichi Unit 1-4 (Jan. 12th – 19th Refer to the attached table for details of ①-⑤)

⑤Radioactive materials in the atmosphere / soil
【Goal】 Mitigation of dispersion of radioactive materials(achieved)
【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】 Work for Installing a cover over the severely damaged reactor building to prevent further release of radioactive materials. (Construction work completed at Unit 1, Preparation work at Unit 3 and 4.)
 Work for installing a system to keep PCV pressure around atmospheric level for the purpose of reducing the leak of radioactive substance. (Construction work completed at Units 1 and 2. Work continues at Units 3.)

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. Removing of radioactive materials in the pool is being conducted before desalination at Units 2, 3.

③Accumulated water
【Goal】 Reduction of total amount of contaminated water (achieved)
【Status】Treatment of high level radioactive wastewater (Approx. 76,200m³ [1/17]) in progress
【The latest challenge & action】
 •The challenge is to operate the treatment facility stably and effectively. (Capacity factor of the decontamination systems; 27%, 63% [1/10-1/17])
 •Storage capacity for the radioactive waste produced by water treatment is being enhanced (Occupancy of storage space: Sludge 83%, Used vessels 28% [1/17])



①Reactor cooling(Units 1-3)
【Goal】 Cold shutdown condition (achieved)
【Status】 Circulating injection cooling in progress
【The latest challenge & action】Injection system diversification is planned for the purpose of improving reliability.
 Hydrogen concentration control in RPV enhanced at Units 1 – 3 [11/24-]

④Ground water
【Goal】 Mitigation of contamination in the ocean (achieved)
【Status】 Monitoring the radioactive materials in the groundwater
【The latest challenge & action】 Construction work for ocean-side wall started on October 28th.




		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 Diesel Generator once had started in response to loss of external power stopped when the tsunami hit these plants.					
① Reactor cooling	Status	Core and fuel integrity	Damaged (Most core melted and relocated downwards*1)	Damaged (Damaged/melted core partly relocated downwards*1)	Damaged (Damaged/melted core partly relocated downwards*1)	No fuels loaded	
		RPV structural integrity	Likely damaged by melted core*1	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
	measures	Goal of STEP 2 (Jul. through Dec., 2011)	To achieve Cold shutdown condition: 1) Temperature of RPV bottom and containment is, in general, below 100°C, 2) Release of radioactive materials from PCV is under control and public radiation exposure by additional release is being significantly held down (Target: not exceeding 1 mSv/year at the site boundary.) (Achieved)				"Cold shutdown status" is redefined in the status progress report issued on July 19.
		Circulating injection cooling	System in operation [partial operation: 6/27-, full operation: 7/2-]				
	Challenge	Nitrogen gas injection into PCV	Injection to PCV in progress [4/6-] Injection to RPV started [11/30-]	Injection to PCV in progress [6/28-] Injection to RPV started [12/1-]	Injection to PCV in progress [7/14-] Injection to RPV started [11/31-]		High concentration, approx. 60%, of Hydrogen was detected in the PCV spray system piping and then replaced with Nitrogen. [10/9]
		Continuation and enforcement of the circulating injection cooling	Further diversification of injection system is planned for the purpose of improving reliability. Radioactive Xe was detected at Gas space in the unit-2 containment vessel. TEPCO has been carefully investigating and monitoring situation.				NISA endorsed the TEPCO's judgement that the detected Xe had been produced by spontaneous fission of the radioactive curium in the damaged fuel.
	② SFP cooling	Status	Fuel integrity in SFP	Most spent fuels not damaged*2	Most spent fuels not damaged*2	Most spent fuels not damaged*2	Most spent fuels not damaged*2
			SFP cooling	Function recovered	Function recovered	Function recovered	Function recovered
measures		Goal of STEP 2 (Jul. through Dec., 2011)	More stable cooling: Establishment of circulation cooling with Hx (Achieved)				
		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-]	
③ Accumulated water	measures	Desalination of the pool water	— (No seawater injected)	Removing of radioactive materials conducted [11/6-12/5] Desalination equipment to be started	Removing of radioactive materials started [1/14-]	Desalination equipment operated [8/20-11/8] Ion exchange equipment started [11/29-]	Removing of radioactive materials in the pool to be conducted before desalination at Units 2, 3
		Goal of STEP 2 (Jul. through Dec., 2011)	Reduction of total amount of contaminated water (Achieved)				
	Challenge	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. 76,200m ³ [1/17])				
		Installation of water process facility	Highly radioactive wastewater treatment system installed on June 17 is now working on a full-scale basis. (Capacity 1200m ³ /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. The additional desalination unit installed in Oct was on line on Nov 1st.				
		Storage / management of sludge waste etc.	Sludge waste and used-adsorption tower generated from the high-level radioactive water processing facility have been properly managed. Construction work for storage facilities of sludge waste and used-adsorption vessel in order to expand storage capacity. Temporary storage facilities of used-adsorption vessel was set up. [12/12]				
	measures	Securing storage place	Storage capacity of 14800m ³ (10,000m ³ + 4,800m ³) 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 (2,800m ³ installed [9/7]) Storage tanks to receive processed, low to middle level radioactive wastewater with the capacity of approx. 135,200m ³ installed [-12/12].				
		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.				
	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 Dec., 2011)	Reduction of total amount of contaminated water (Achieved)				
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.					
	Decontaminating radioactive water	Decontamination with zeolite continued					
④ Ground water	measures	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-]				
		Mitigation of groundwater contamination	Mitigation of contamination in the ocean (continuing from Step 1) (Achieved) Pumps for correcting underground water called "subdrain" have been restored. Subdrain is being treated in accordance with the contaminated water management plan. Construction work for ocean-side wall started on October 28th.				
⑤ 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 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 December was estimated to be about 60 million Bq/h (Cs-134 and 137) at maximum. [TEPCO announced on 12/16] Exposure doses at the site boundary caused by radioactive substance currently being released was estimated to be 0.1 mSv/y at maximum on the assumption of the above release rate. (※) Approx. one 13-millionth of the maximum emission rate on 3/15, approx. one 42,000th of the rate for 3/25-26, approx. one 4,800th of the rate for 4/4-6, approx. one 17th 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	
	measures	Goal of STEP 2 (Jul. through Dec., 2011)	Mitigation of dispersion (Achieved)				
		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	Completed on Oct 29th	—	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
⑥ Tsunami, reinforcement, etc.	measures	Installation of PCV gas control system	In operation [12/8-]	In operation [10/29-]	Preparation work in progress [9/30-]	To be installed after RPV bottom temperatures going down below 100°C	
		Goal of STEP 2 (Jul. through Dec., 2011)	Mitigation of further disasters (Achieved)				
Plant parameters	Reactor	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]	
		Reactor injection flow rate(m ³ /h) [1/19 11:00]	4.5 via feed water line. 1.9 via core spray line Increasing※	4.0 via feed water line. 6.0 via core spray line Increasing※	4.0 via feed water line. 5.0 via core spray line Increasing※	—	Decay heat [10/17]: 0.6MW(Unit 1), 0.9MW(Units 2, 3) 0.04% of full power
		Reactor water level (mm) [1/19 11:00]	A: Below the lower end of gauge. B: -1830** Mostly steady	A: Below the lower end of gauge. B: -2119. Mostly steady**	A: -2227, B: -2216 Mostly steady**	—	■ "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
		Reactor pressure (MPa) [1/19 11:00]	A: 0.005, B: -, Mostly steady Measured with temporary pressure indicator [6/4-]	A: 0.004, B: - Mostly steady	A, B: Below the lower end of gauge**	—	※Reactor injection flow rates were increased again as the hydrogen concentration in RPV was estimated to have decreased after nitrogen injection to RPV began. **Continuously monitoring the status
	PCV	RPV temperature at feedwater nozzle (°C)[1/19 11:00]	26.5 Mostly steady※	47.8 Mostly steady※	45.2 Slightly declining※	—	
		RPV temperature at the bottom of the vessel (°C) [1/19 11:00]	26.8 Mostly steady※	50.7 Mostly steady※	53.6 Slightly declining※	—	
	Pool	Pressure of drywell (MPa) [1/19 11:00]	0.1075 Mostly steady	0.109 Mostly steady	0.1016 Mostly steady	—	
		Pressure of suppression pool (MPa)	0.120 Mostly steady	Below the lower end of gauge Instrument failure	0.1882 Mostly steady	—	
	High level accumulated water	Water temperature of SFP [1/19 11:00]	14.5°C	13.2°C	13.0°C	22°C	
Storage volume[1/17]		14,100m ³	20,700m ³	23,200m ³	18,200m ³		
Water level in T/B[1/17]		OP.+3,231mm	OP.+2,877mm	OP.+2,973mm	OP.+3,029mm	OP.: Onahama Bay mean sea level Near-term target: OP. +3,000mm*3	
Total stored volume[1/17]		Approx. 76,200m ³ (Approx. 96,990m ³ including the wastewater transferred to the Centralized Radiation Waste Treatment Facility)					
Environmental effect in the vicinity of the station	Total volume of processed water [-1/17]	Approx. 207,330m ³ decontaminated					
	Waste produced [-1/17]	Sludge: 581m ³ (Storage capacity 700m ³), Used-adsorption vessels: 322 (Storage capacity 1,137). Concentrated waste liquid: 5,442m ³ * (Storage capacity 9,500m ³)					
Radiation exposure of the workers	Air dose rate: 4-88 μSv/h at the NPS border (Monitoring Post), 279 μSv/h at the south side of the office building, 28 μSv/h at the main gate, 11 μSv/h at the wet gate [1/19 12:00] Some radioactive materials (I, Cs, Pu, Am Cm and Sr) have 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.						
	TEPCO announced the radiation exposure doses of 18,846 workers who had started working at the Fukushima Dai-ichi NPS from March to November. [12/27] 171 workers received more than 100mSv. (100-150mSv: 139 workers, 150-200mSv: 23 workers, 200-250mSv: 3 workers, 250mSv-: 6 workers) Exposure doses of 6 workers who received more than 250mSv are distributed from 309 to 678mSv. *The radiation exposure dose limit for emergency workers was set at 250mSv as a special measure on March 14. The special measure was abolished, making the limit original one, 100mSv, when the goal of "Step 2" was achieved.						

- *1 TEPCO estimated based on the various analyses and evaluations [announced on 11/30]
- *2 TEPCO judged that most spent fuels were not damaged in the SFPs of Unit 1 through 4 based on the detailed analyses of the pool water.
- *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.

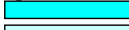
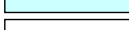

[Source]

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 (cause difficulties in settling the accident)

[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