

Current Status of “Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO” (Revised edition)

Appendix 3

November 17, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

Red colored letter: changed from the previous version, : already reported to the government, Green colored shading: achieved target

Issues	As of Apr. 17	Step 1 (around 3 months)	Step 2 (through the end of this year) current status (as of Nov. 17)	Mid-term issues (around 3 years)
I. Cooling	(一) Reactor	Fresh water Injection	Stable cooling	Cold shutdown condition
II. Mitigation	(二) Spent Fuel Pool	Fresh water injection	Stable cooling	More stable cooling
II. Mitigation	(三) Accumulated Water	Transferring water with high radiation level Storing water with low radiation level	Secure storage place	Reduction of total amount of accumulated water
II. Mitigation	(四) Ground water	Mitigation of contamination in groundwater Consideration of method of impermeable wall against groundwater	Mitigate ocean contamination	Mitigate ocean Contamination (continued)
II. Mitigation	(五) Atmosphere / Soil	Dispersion of inhibitor Removal / management of debris	Mitigate scattering	Mitigate scattering (continued)

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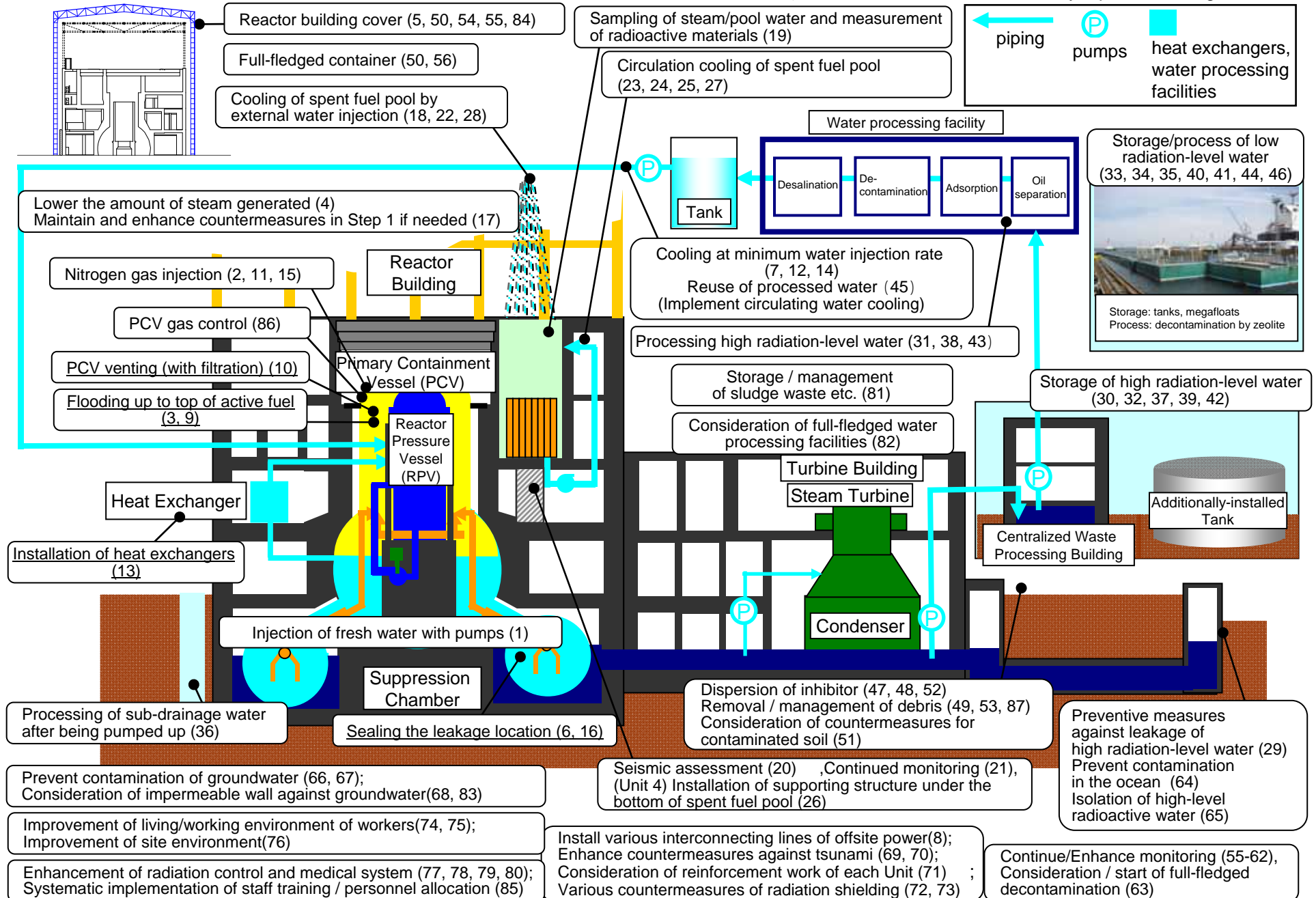
November 17, 2011
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Issues		As of Apr. 17	Step 1 (around 3 months)	Step 2 (through the end of this year) current status (as of Nov. 17)	Mid-term issues (around 3 years)
III. Monitoring/ Decontamination	(9) Measurement, Reduction and Disclosure		Expansion, enhancement and disclosure of radiation dose monitoring in and out of the power station	Decontamination	Continuous environmental monitoring
				Consideration/start of full-fledged decontamination	Continuous decontamination
IV. Countermeasures against aftershocks, etc	(7) Tsunami, Reinforcement, etc		Enhancement of countermeasures against aftershocks and tsunami, preparation for various countermeasures for radiation shielding	Mitigate disasters	Continue various countermeasures for radiation shielding
			(Unit 4 spent fuel pool) Installation of supporting structure	Consideration of reinforcement work of each Unit	Reinforcement work of each Unit
V. Environment improvement	(8) Living/working environment		Improvement of workers' living / working environment	Enhancement of environment improvement	Improvement of workers' living / working environment
	(9) Radiation control / Medical care		Improvement of radiation control / medical system	Enhancement of Healthcare	Improvement of radiation control / medical system
	(10) Staff Training/ personnel allocation			Systematic implementation of staff training / personnel allocation	Exhaustive radiation dose control
Action plan for mid-and-long- term issues				Concept of mid-term security	
				Establishing plant operation plan based on mid-term security	Response based on the plant operation plan
				Formulating a mid-and- long-term roadmap	

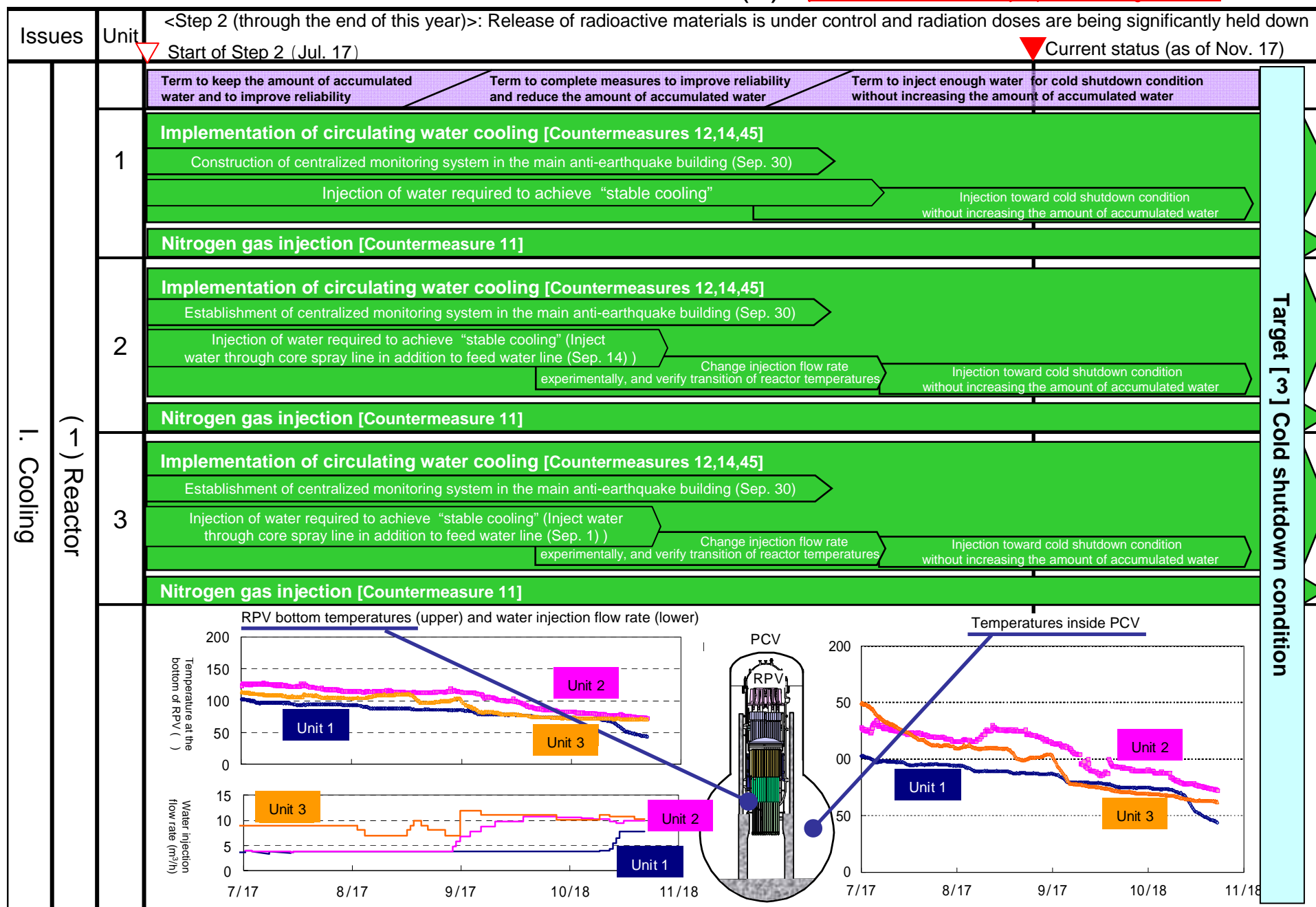
Overview of Major Countermeasures in the Power Station as of November 17

Underlined: deleted countermeasures, red colored: newly added countermeasures, : already reported to the government



Current Status of Countermeasures (1)

Red frame: progressed countermeasures from the previous version, : already reported to the government



Target [?] Cold shutdown condition

Legend : Implemented (monitored by government as necessary) : Safety check by government (reported) : Under construction : Field work started : Field work not started yet

Current Status of Countermeasures (2)

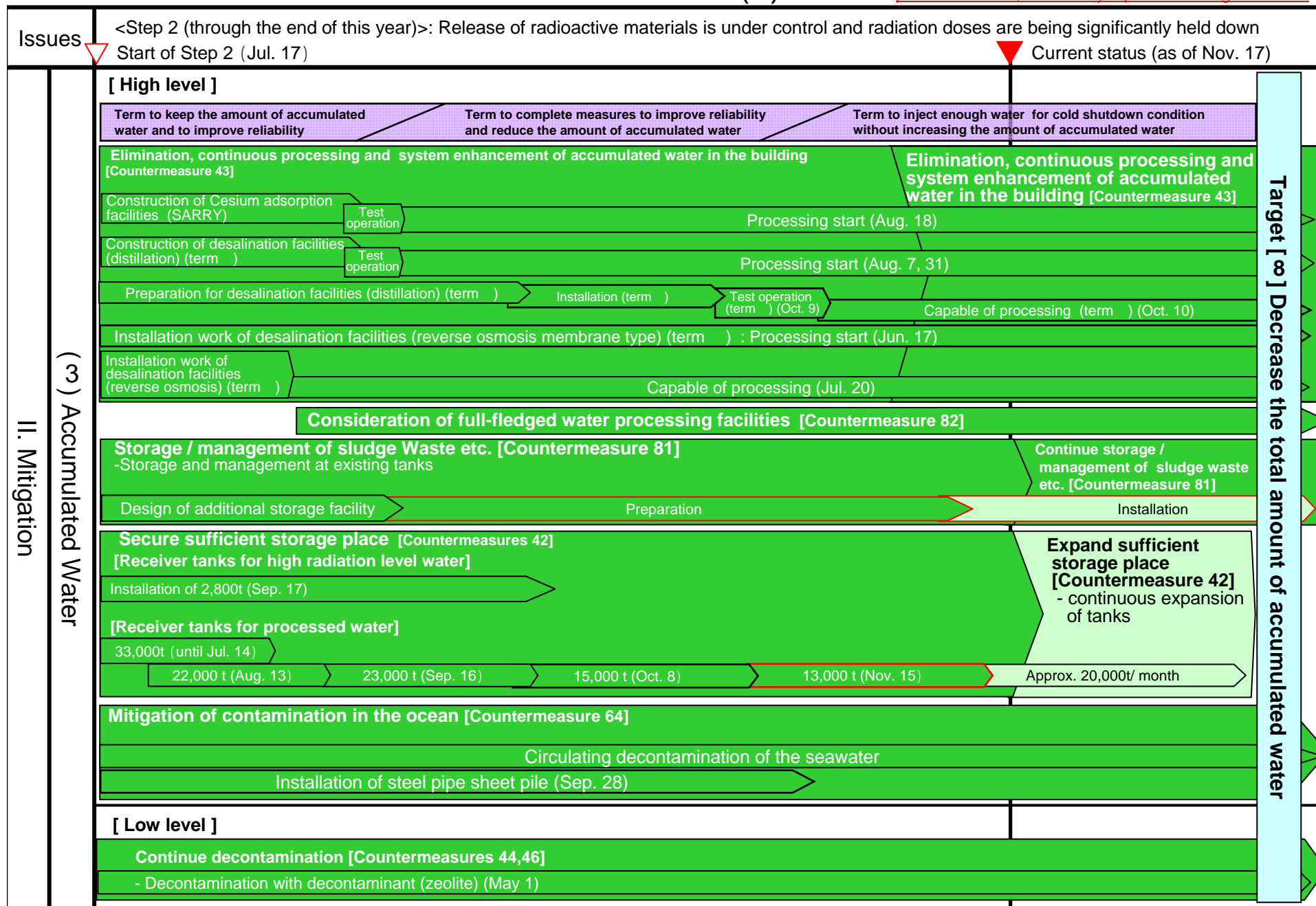
Red frame: progressed countermeasures from the previous version. : already reported to the government

Issues	Unit	<Step 2 (through the end of this year)>: Release of radioactive materials is under control and radiation doses are being significantly held down	
		Start of Step 2 (Jul. 17)	Current status (as of Nov. 17)
I. Cooling	(2) Spent Fuel Pool	Target [5] More stable cooling	
	1	Water injection through normal cooling system [Countermeasure 24] Cooling by installation of heat exchanger [Countermeasures 25,27] -Circulating water cooling operation (from Aug. 10)	
	2	Cooling by installation of heat exchanger [Countermeasures 25,27] -Circulating water cooling operation (from May 31)	Desalination of Spent Fuel Pool water
	3	Cooling by installation of heat exchanger [Countermeasures 25,27] -Circulating water cooling operation (from Jun. 30)	Desalination of Spent Fuel Pool water
	4	Restoration of injection through normal cooling system [Countermeasure 24] -Water injection by installation of alternative system to "Giraffe" (Jun. 17) Cooling by installation of heat exchanger [Countermeasures 25,27] -Circulating water cooling operation (from Jul. 31)	Desalination of Spent Fuel Pool water (from Aug. 20)

Legend  : Implemented (monitored by government as necessary) : Safety check by government (reported)  : Under construction  : Field work started  : Field work not started yet

Current Status of Countermeasures (3)

Red frame: progressed countermeasures from the previous version. : already reported to the government



Legend : Implemented (monitored by government as necessary) : Safety check by government (reported) : Under construction : Field work started : Field work not started yet

Current Status of Countermeasures (4) Red colored letter: newly added countermeasures, Red frame: progressed countermeasures from the previous version, : already reported to the government

Issues		<Step 2 (through the end of this year)>: Release of radioactive materials is under control and radiation doses is being significantly held down		Start of Step 2 (Jul. 17)		Current status (as of Nov. 17)	
II. Mitigation	(4) Groundwater	Implementation of preventions against expansion of groundwater contamination [Countermeasure 67] - Restoration of sub-drainage pumps with expansion of storage / processing facilities				Target [4] Mitigation of ocean contamination	
		Design of impermeable wall against groundwater [Countermeasure 68] Start establishment of impermeable wall against groundwater [Countermeasure 83] (Oct. 28)					
	(5) Atmosphere / Soil	Confirmation of solidification of inhibitor [Countermeasure 52]				Target [0] Prevent scattering of radioactive materials	
		Removal / management of debris [Countermeasure 53, 87] -Collected debris (Volume of approx. 900 containers (as of Nov. 17)) -Management of collected debris etc. in storage areas Spraying treated water, which meets the guideline in the bathing area, in the NPS to prevent radioactive dust from scattering (Oct. 7)					
		Installation of reactor building cover (Unit 1) [Countermeasures 54,55] - Completed (Oct. 28)					
		Removal of debris at the upper parts of reactor buildings (Unit 3&4) [Countermeasures 84] - Started debris removal at the upper parts of reactor buildings (Unit3: Sep. 10, Unit4: Sep. 21)					
		Preparation for Unit 3 (Removal of debris on the ground, maintenance of road for crane etc.)		Debris removal at the upper part of reactor building			
		Preparation for Unit 4 (Removal of debris on the ground, maintenance of road for crane etc.)		Debris removal at the upper part of reactor building			
		Consideration of reactor building container [Countermeasure 50]					
		Installation of PCV gas control system [Countermeasure 86] Unit 1: Started construction (Oct. 10), Unit 2: Completed (Oct. 28), Unit 3: Started construction (Sep. 30)					
III. Monitoring / Decontamination	(6) Measurement, Reduction and Disclosure	Continue to assess current release of radioactive materials from PCVs [Countermeasures 60,61] · The current release rates (Cesium) from PCVs of Units 1 to 3 were assessed based on the airborne radioactivity concentration (dust concentration) at the upper parts of the reactor buildings, etc. - The current total release rate from Units 1-3 based on the assessment this time is estimated at approx. 0.06 billion Bq/h at the maximum which is 1/13,000,000 of that at the time of the accident. - The radiation exposure per year at the site boundaries is assessed at approx. 0.1 mSv / year at the maximum based on the aforementioned release rate (The target is 1 mSv / year. Excluding the effect of the radioactive materials already released up until now).				Target [2] Sufficiently reduce radiation dose	
		Implementation of monitoring in cooperation with the government, prefectures, municipalities and TEPCO [Countermeasures 62]					
		Consideration / start of full-fledged decontamination [Countermeasures 63] - Detailed monitoring has begun at the area where the government shall implement decontamination based on the "Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials" (Nov. 7). -"Decontamination model project at the Restricted Area or the Deliberate Evacuation Area, etc." has begun (Nov. 8) - Basic policy based on the "Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials" was decided in cabinet(Nov. 11).					

Legend : Implemented (monitored by government as necessary) : Safety check by government (reported) : Under construction : Field work started : Field work not started yet

Current Status of Countermeasures (5)

Red colored letter: newly added countermeasures, Red frame: progressed countermeasures from the previous version, : already reported to the government

Issues		<Step 2 (through the end of this year) Release of radioactive materials is under control and radiation doses are being significantly held down Start of Step 2 (Jul. 17)		Current status (as of Nov. 17)	
IV. Countermeasures against aftershocks, etc	(7) Tsunami, reinforcement, etc	(Unit 4) Installation of supporting structure under the bottom of the fuel pool [Countermeasure 26] (Jul. 30)		Consideration of reinforcement work of each Unit [Countermeasure 71] - Evaluation of seismic resistance has been completed (Aug.26)	
		Continue various countermeasures for radiation shielding [Countermeasure 73]			
V. Environment improvement	(8) Living / working Environment	Continuation and enhancement of improvement of workers' living / working environment [Countermeasure 75] - Accommodations for approx. 1,600 people have been prepared. Approx. 1,200 people have already moved in (as of Nov. 1) -20 on-site rest stations have been established (approx. 4,750m ² in size with a capacity to accommodate approx. 1,600 people) (as of Nov. 1)			
	(9) Radiation control / Medical care	Continuous improvement of radiation control [Countermeasure 78] - Reinforcement of radiation control by NISA - Expansion of whole-body counters, implementation of monthly internal exposure measurement - Automated recording of personal radiation dose, written notification of exposure dose , introduction of workers' certificates with photos - Consideration of long-term healthcare such as enhancement of safety training for workers and establishing database etc.			
		Continuous reinforcement of medical system [Countermeasure 80] - Install new emergency medical facility, establish organization with resident specialists (on call 24 hours a day), speedy transportation of patients - Intensive preventive measures against heat stroke (trainings for new workers), countermeasures for mental health, conducting medical examination, prevention and mitigation of flu - Establish industrial hygiene system such as preventive healthcare			
	(10) Staff Training / personnel allocation	Systematic staff training and personnel allocation [Countermeasure 85] - Promote human resources training in conjunction with the government and TEPCO			

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