

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

Red colored letter: newly added to 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 Oct. 17)	Mid-term issues (around 3 years)	
I. Cooling	(1) Reactor	Fresh water Injection	Cooling by minimum injection rate (injection cooling) Consideration and preparation of reuse of accumulated water Nitrogen gas injection ☆ Improvement of work environment ☆	Stable cooling Circulating water cooling (start) ☆ Nitrogen gas injection (continued) Improvement of work environment ☆	Cold shutdown condition Continuous cold shutdown condition Protection against corrosion cracking of structural materials* *partially ahead of schedule
			Fresh water injection Reliability improvement in injection operation / remote-control operation *ahead of schedule Circulation cooling system (installation of heat exchanger) ☆ *partially ahead of schedule	Stable cooling Remote-controlled injection operation Consideration / installation of heat exchanging function	More stable cooling Start of removal work of fuels
II. Mitigation	(2) Accumulated Water	Transferring water with high radiation level Storing water with low radiation level	Installation of storage / processing facilities ☆ Installation of storage facilities / decontamination processing	Secure storage place Expansion ☆ / consideration of full-fledged processing facilities Decontamination ☆ / desalination processing (reuse), etc Storage / management of sludge waste etc. ☆ Mitigation of contamination in the ocean	Reduction of total amount of accumulated water Installation of full-fledged water processing facilities Continuous processing of accumulated water Storage / management of sludge waste etc. Research on processing of sludge waste etc. Mitigation of contamination in the ocean
			Mitigation of contamination in groundwater Consideration of method of impermeable wall against groundwater	Mitigate ocean contamination (Restoration of sub-drainage pumps with expansion of storage / processing facilities) Design / implementation of impermeable wall against groundwater	Mitigate ocean contamination (continued) Mitigation of contamination in groundwater Establishment of impermeable wall against groundwater
	(3) Ground water			Mitigate scattering Dispersion of inhibitor (continued) Removal / management of debris (continued) Installation of reactor building cover (Unit 1) ☆ Removal of debris (top of Unit 3&4 R/B) Consideration of reactor building container Installation of PCV gas control system	Mitigate scattering (continued) Dispersion of inhibitor Removal / management of debris Removal of debris / installation of reactor building cover (Unit 3&4) Start of installation work of reactor building container Installation of PCV gas control system

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

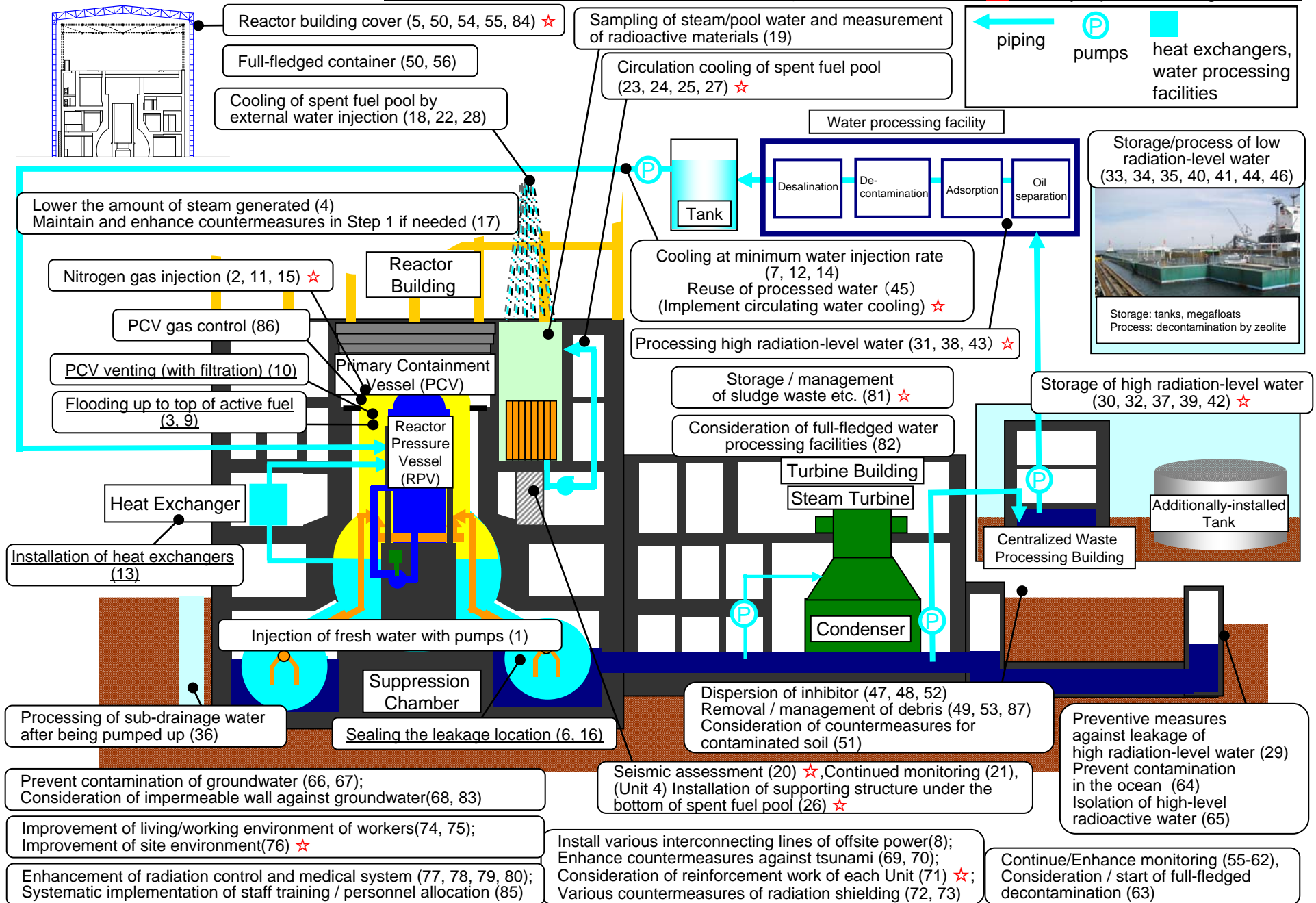
October 17, 2011  
 Nuclear Emergency Response Headquarters  
 Government-TEPCO Integrated Response Office

Red colored letter: newly added to the previous version, ☆: already reported to the government, Green colored shading: achieved object

Issues		As of Apr. 17	Step 1 (around 3 months)	Step 2 (through the end of this year) current status (as of Oct. 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 for 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	Systematic implementation of staff training / personnel allocation
Action plan for mid-term issues		Government's concept of securing safety			Response based on the plant operation plan	
		Establishing plant operation plan based on the safety concept				

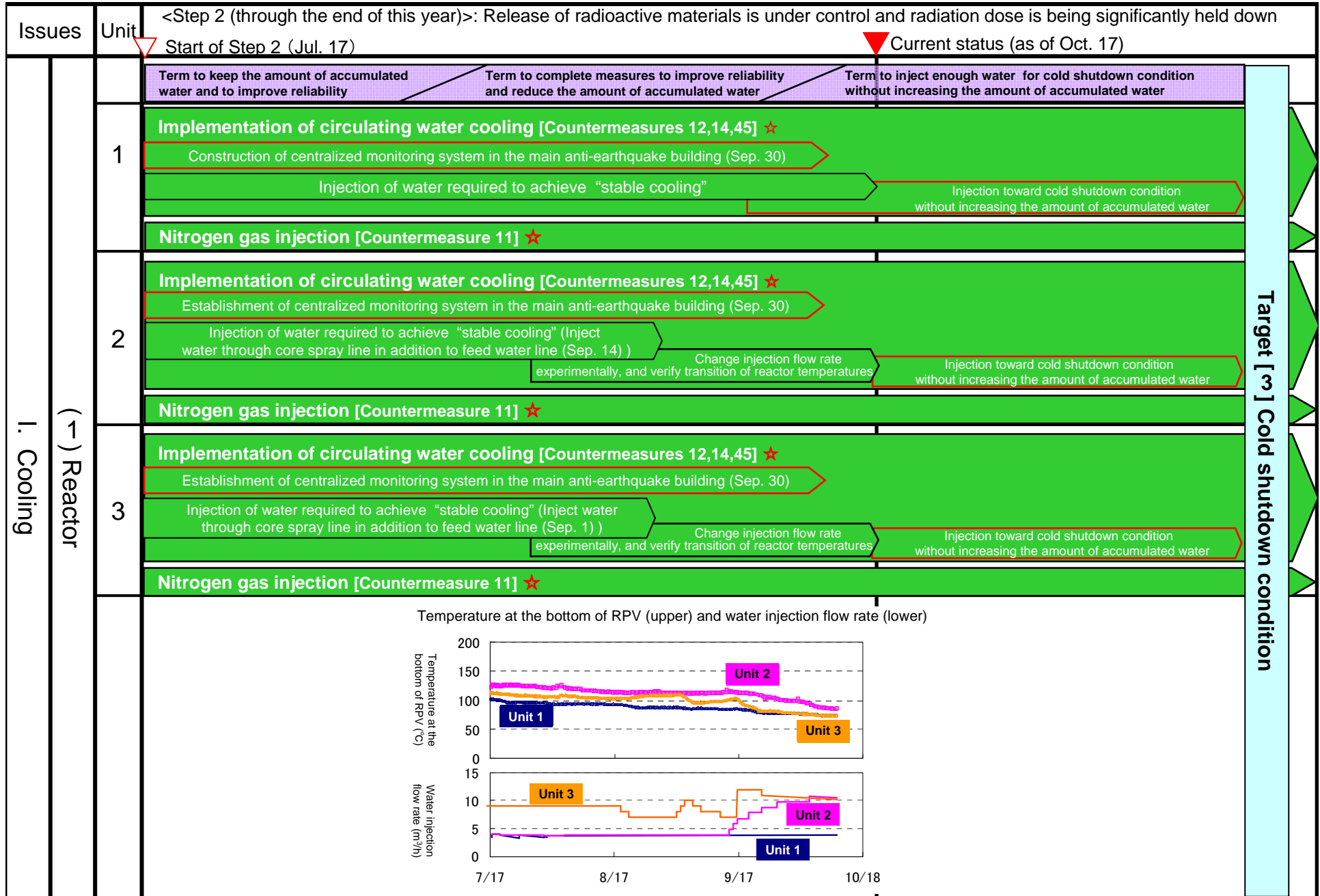
# Overview of Major Countermeasures in the Power Station as of October 17

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



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)

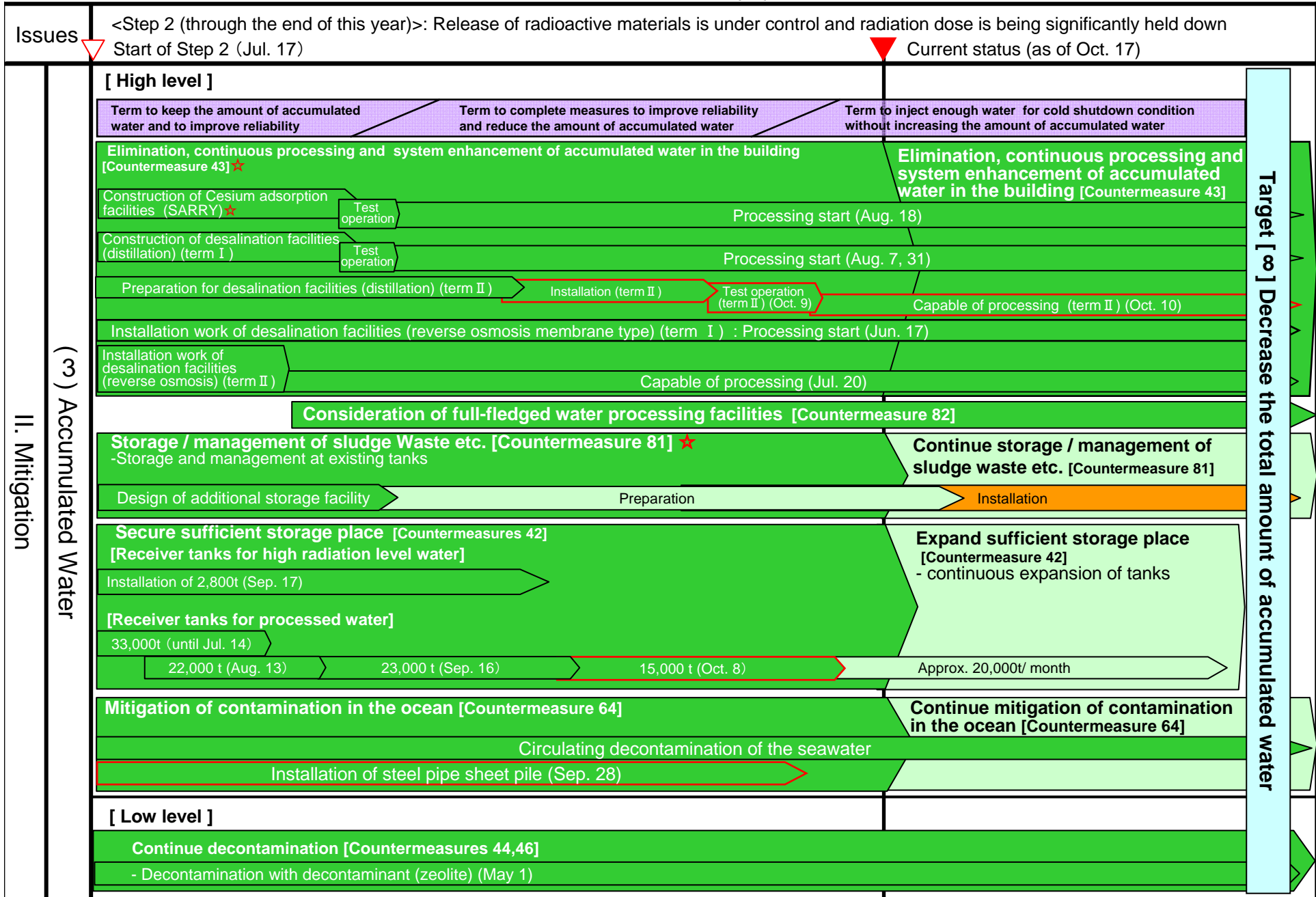
Red frame: progressed countermeasures from the previous version, ☆: already reported to the government V

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

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



Target [∞] Decrease the total amount of accumulated water

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

vii

Issues		<Step 2 (through the end of this year)>: Release of radioactive materials is under control and radiation dose is being significantly held down Start of Step 2 (Jul. 17)	Current status (as of Oct. 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 [1] Mitigation of ocean contamination	
		Design of impermeable wall against groundwater [Countermeasure 68]	Start establishment of impermeable wall against groundwater [Countermeasure 83] (planned around the end of Oct.)	
	(10) 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 Oct. 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] ☆ - Under construction (planned to be completed at around the end of Oct.)		
		Removal of debris on top of reactor buildings (Unit 3&4) [Countermeasures 84] - Under preparatory construction (Unit3: Jun. 20, Unit4: Jun. 24)		
		Preparation for Unit 3 (Removal of debris on the ground, maintenance of road for crane etc.,)	Removal of debris on top of reactor building (Sep. 10)	
		Preparation for Unit 4 (Removal of debris on the ground, maintenance of road for crane etc.,)	Removal of debris on top of reactor building (Sep. 21)	
		Consideration of reactor building container [Countermeasure 50]		
	Installation of PCV gas control system [Countermeasure 86]	Start installation work (Unit 1: Oct. 7, Unit 2: Oct. 10, Unit 3 (preparatory work): Sep. 30)		
III. Monitoring / Decontamination	(9) Measurement, Reduction and Disclosure	Continue to assess current release of radioactive materials from PCVs [Countermeasures 60,61] <ul style="list-style-type: none"> <li>The current release rates from PCVs of Units 1 to 3 were assessed comprehensively utilizing the airborne radioactivity concentration (dust concentration) at the upper part of the reactor buildings, the land and the sea.</li> <li>The current total release rate from Units 1-3 based on the assessment this time is estimated at approx. 0.1 billion Bq/h at the maximum (provisional figure), which is 1/8,000,000 of that at the time of the accident.</li> <li>The radiation exposure per year at the site boundaries is assessed at approx. 0.2 mSv / year at the maximum (provisional figure) based on the aforementioned release rate (The target is 1 mSv / year. Excluding the effect of the radioactive materials already released until now).</li> </ul>	Target [2] Sufficiently reduce radiation dose	
		Implementation of monitoring in cooperation with the government, prefectures, municipalities and operators [Countermeasures 62]		
		Consideration / start of full-fledged decontamination [Countermeasures 63] "Basic Concept for Pushing Ahead with Decontamination Works" and "Basic Policy for Emergency Response on Decontamination Work", etc. have been established (Aug. 26). Substantiative decontamination operations have been conducted since the end of Aug.		

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 dose is being significantly held down Start of Step 2 (Jul. 17)	Current status (as of Oct. 17)
IV. Countermeasures against aftershocks, etc	(7) Tsunami, reinforcement, etc	<p><b>(Unit 4) Installation of supporting structure under the bottom of the fuel pool [Countermeasure 26] ☆</b> (Jul. 30)</p> <p><b>Consideration of reinforcement work of each Unit [Countermeasure 71]</b> - Evaluation of seismic resistance has been completed (Aug.26) ☆</p> <p><b>Continue various countermeasures for radiation shielding [Countermeasure 73]</b></p>	<p>Target [9] Mitigation of disasters</p>
	(8) Living / working Environment	<p><b>Continuation and enhancement of improvement of workers' living / working environment [Countermeasure 75]</b> - Accommodations for approx. 1,600 people have been prepared. Approx. 1,100 people have already moved in (as of Oct. 1) -20 on-site rest stations have been established (approx. 4,400m<sup>2</sup> in size with a capacity to accommodate approx. 1,500 people) (as of Oct. 5)</p>	<p>Target [8] Enhancement of environment of improvement</p>
	V. Environment improvement	(9) Radiation control	<p><b>Continuous improvement of radiation control [Countermeasure 78]</b> - 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.</p>
Medical care		<p><b>Continuous reinforcement of medical system [Countermeasure 80]</b> - 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</p>	<p>Target [9] Enhancement of healthcare</p>
(10) Staff Training / personnel allocation		<p><b>Systematic staff training and personnel allocation [Countermeasure 85]</b> - Promote human resources training in conjunction with the government and operators</p>	<p>Target [2] Exhaustive radiation dose control</p>

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