

# 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 (around 3 to 6 months after achieving Step1) current status (as of Sep. 20)	Mid-term issues (around 3 years)				
I. Cooling	(1) Reactor	Fresh water injection	Cooling by minimum injection rate (injection cooling)	Stable cooling	Cold shutdown condition			
			Consideration and preparation of reuse of accumulated water			Circulating water cooling (start)	Continuous cold shutdown condition	
(2) Spent Fuel Pool	Fresh water injection	Reliability improvement in injection operation / remote-control operation *ahead of schedule	Stable cooling	More stable cooling	Start of removal work of fuels			
		Circulation cooling system (installation of heat exchanger) *partially ahead of schedule				Remote-controlled injection operation		
II. Mitigation	(3) Accumulated Water	Transferring water with high radiation level	Installation of storage / processing facilities	Secure storage place	Reduction of total amount of contaminated water			
			Storing water with low radiation level			Expansion / consideration of full-fledged processing facilities	Installation of full-fledged water processing facilities	
			Installation of storage facilities / decontamination processing			Decontamination / desalt processing (reuse), etc		Continuous processing of accumulated water
			Mitigation of contamination in the ocean			Storage / management of sludge waste etc.		
	(4) Ground water	Mitigation of contamination of groundwater	Mitigate ocean contamination	(Restoration of sub-drainage pumps with expansion of storage / processing facilities)	Mitigate ocean contamination (continued)	Mitigation of contamination of groundwater		
		Consideration of method of impermeable wall against groundwater					Design / implementation of impermeable wall against groundwater	
	(5) Atmosphere / Soil	Dispersion of inhibitor	Removal / management of debris	Dispersion of inhibitor (continued)	Mitigate scattering	Mitigate scattering (continued)		
				Removal / management of debris (continued)			Removal of debris (top of Unit 3&4 R/B)	Removal of debris / installation of reactor building cover (Unit 3&4)
Installation of reactor building cover (Unit 1)				Consideration of reactor building container			Start of installation work of reactor building container	
Installation of PCV gas control system				Installation of PCV gas control system				

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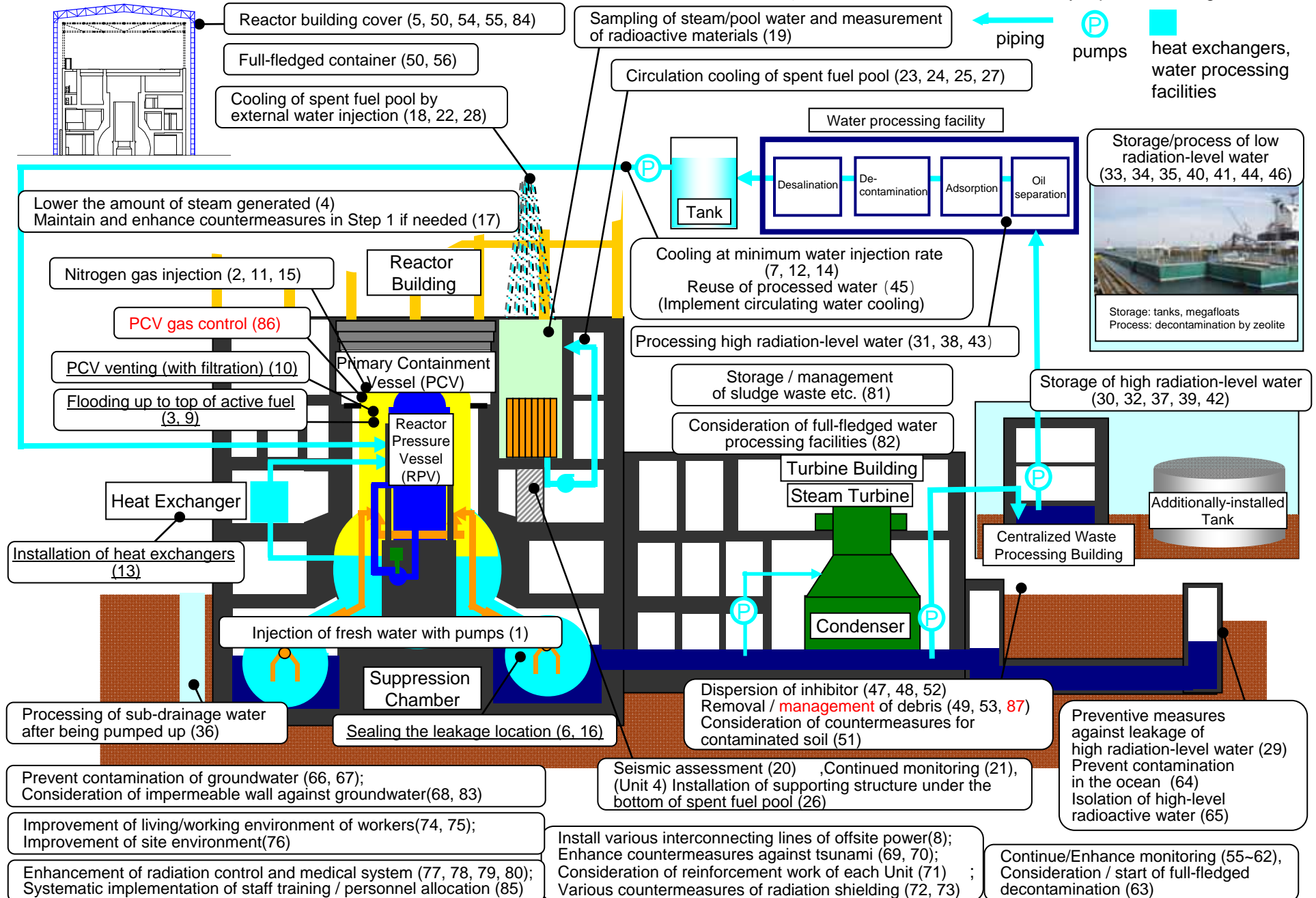
September 20, 2011  
 Nuclear Emergency Response Headquarters  
 Government-TEPCO Integrated Response Office

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 (around 3 to 6 months after achieving Step1) ▼ current status (as of Sep. 20)	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 / implementation 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
Measures 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				

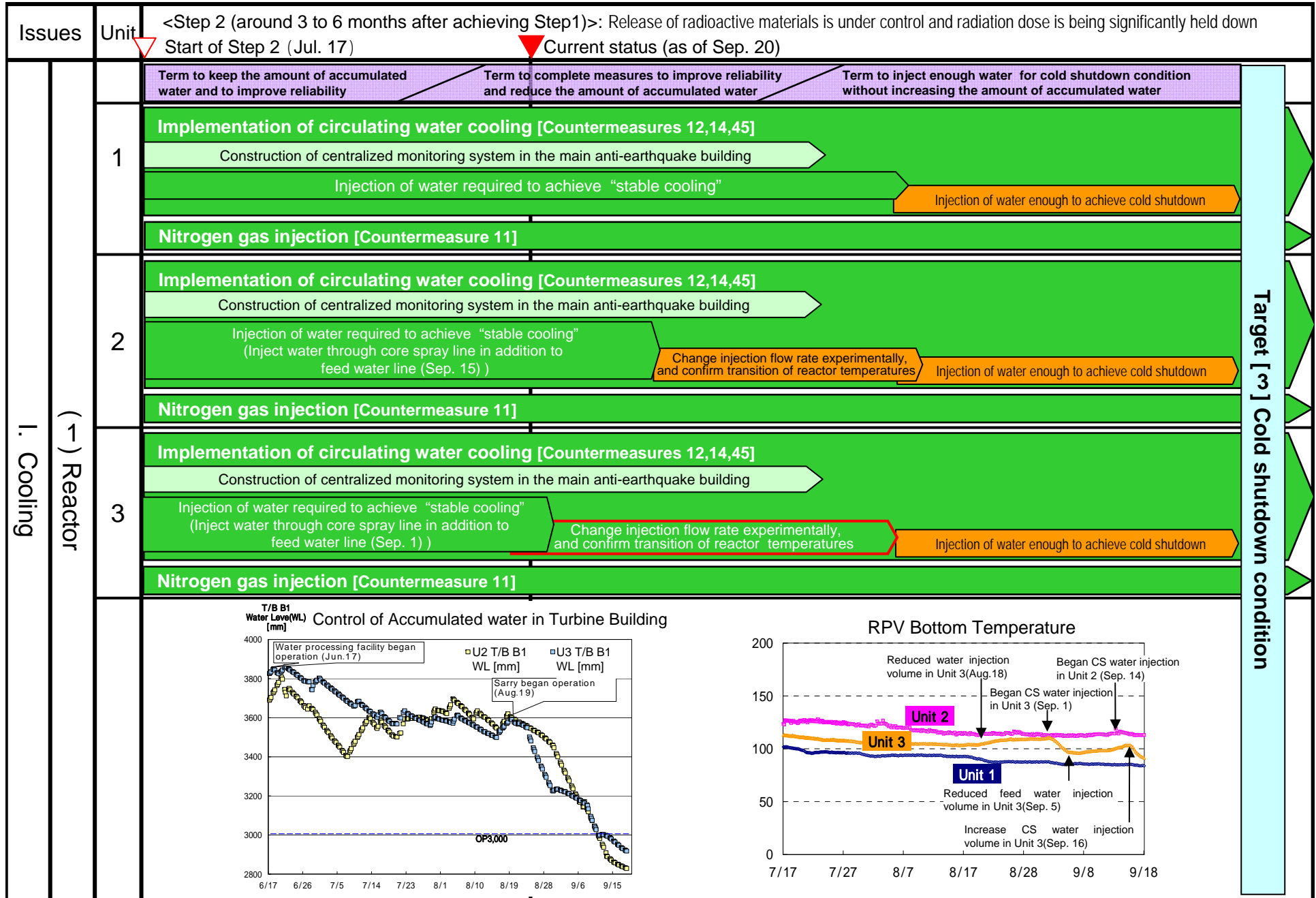
# Overview of Major Countermeasures in the Power Station as of September 20

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



# Current Status of Countermeasures (1)

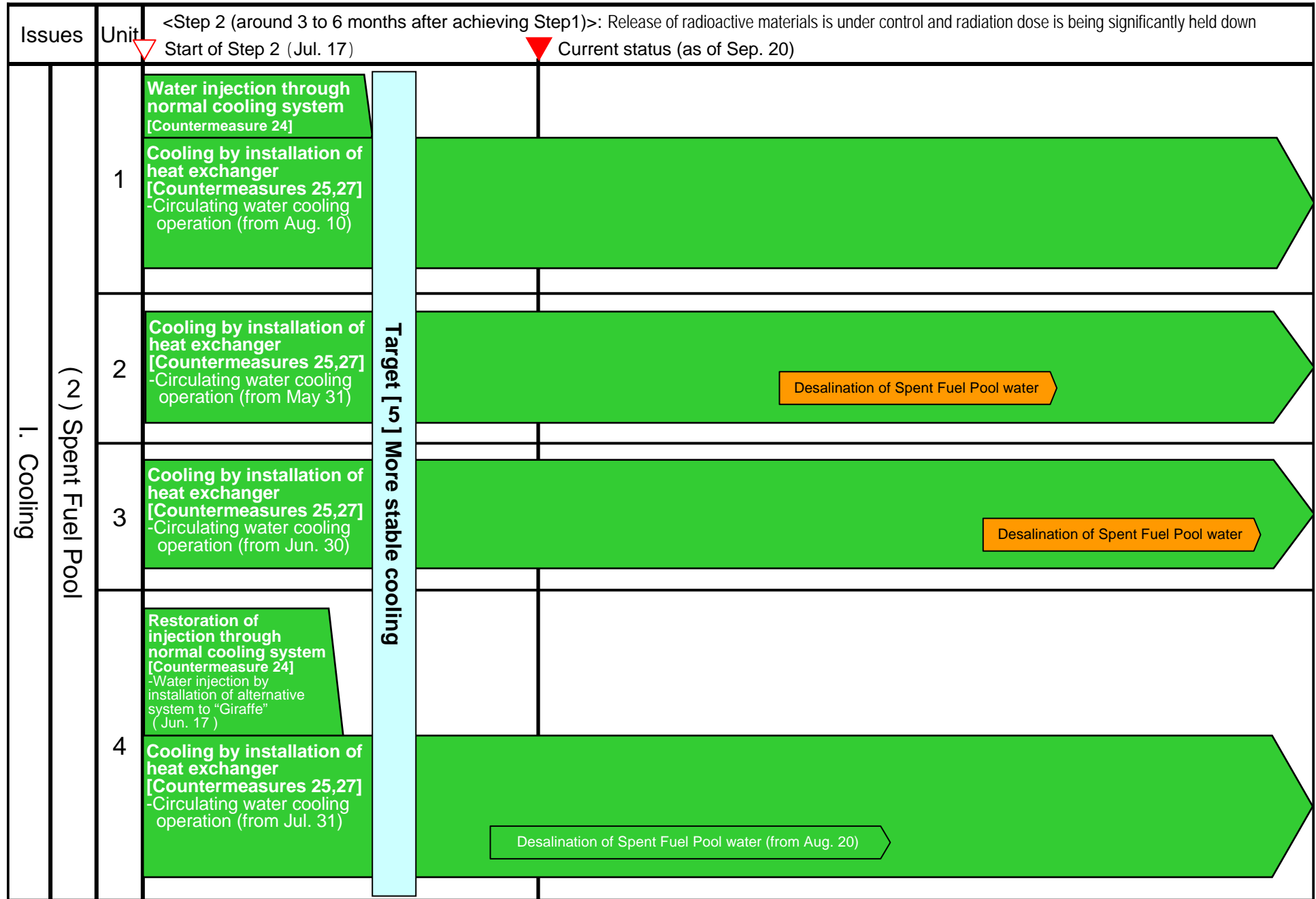
Red frame: progressed countermeasures from the previous version, : already reported to the government



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

# Current Status of Countermeasure (2)

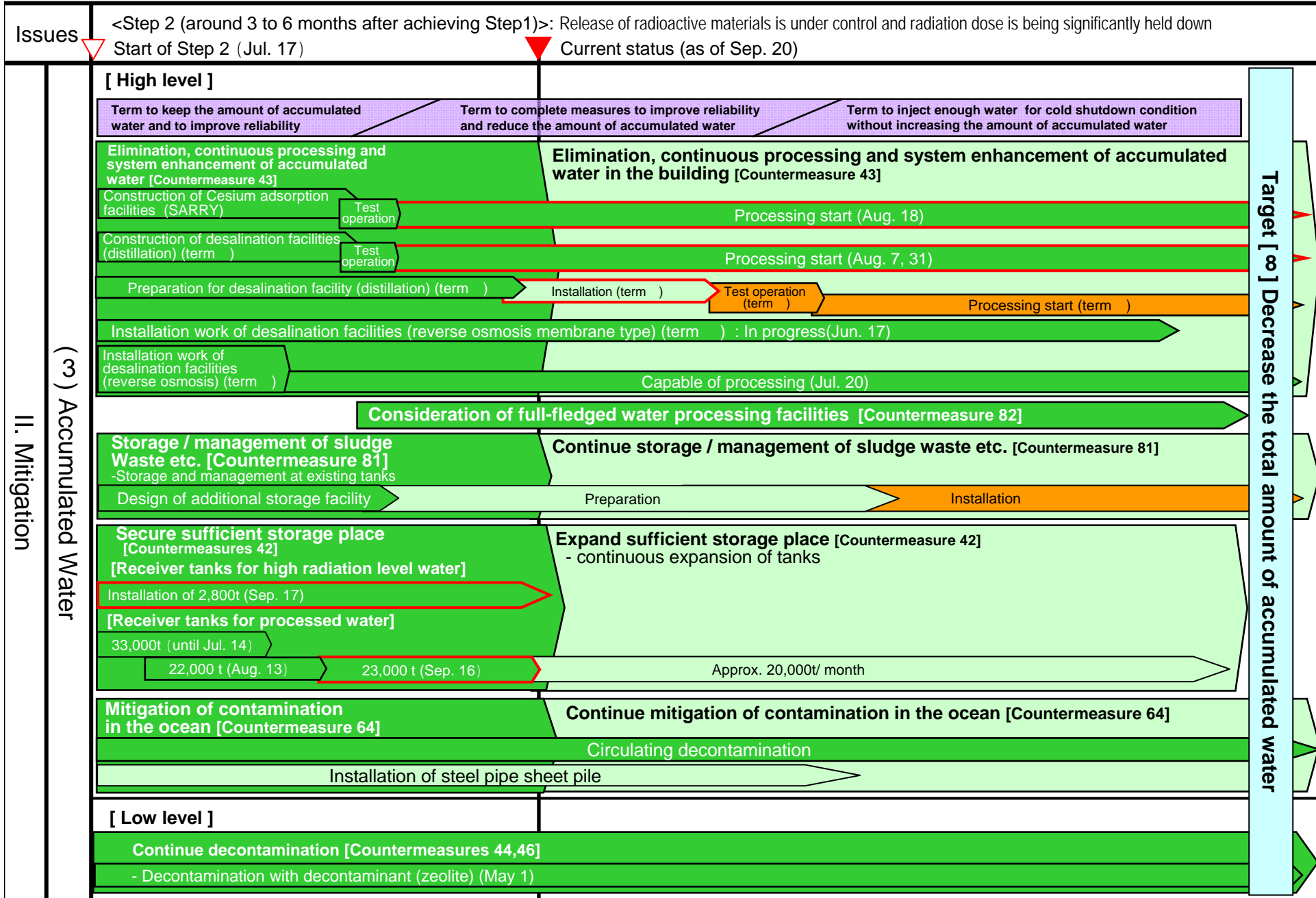
Red frame: progressed countermeasures from the previous version. Yellow frame: already reported to the government



Legend  : Implemented (monitored by government as necessary)  : Safety check by government (report)  : 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 (report) : 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 (about 3 to 6 months after achieving Step1)>: 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 Sep. 20)		
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]	Begin establishment of impermeable wall against groundwater [Countermeasure 83]	
	(5) Atmosphere / Soil	Confirmation of solidification of inhibitor [Countermeasure 52]	Target [0] Prevent radioactive materials scattering	
		Removal / management of debris [Countermeasure 53, 87] -Collected debris (Volume of approx. 800 containers (as of Sep. 20)) -Management of collected debris etc. in storage areas		
		Installation of reactor building cover (Unit 1) [Countermeasures 54,55] - Under construction		
		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 buildings (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 buildings
		Consideration of reactor building container [Countermeasure 50]		
		Installation of PCV gas control system [Countermeasure 86]		
III. Monitoring / Decontamination	(6) Measurement, Reduction and Disclosure	Continue to assess current release of radioactive materials [Countermeasures 60,61] · TEPCO has assessed the current release rate from Unit 1 to Unit 3 utilizing the airborne radioactivity concentration at the upper part of the reactor buildings. - The total current release rate is estimated to be approx. 0.2 billion Bq/h from Unit 1 to Unit 3 (compared to the aftermath of the accident, the present measurement is approx. 1/4,000,000.) - The maximum value of radiation exposure per year at the site boundaries is assessed at approx. 0.4 mSv/year provisionally. (excluding the effect of the radioactive materials already released up until now.) · Continuously implement the measurements of airborne radioactivity concentration at the upper part of the reactor buildings, thus grasping the reduction tendency of the reduced amount from mitigation countermeasures. More accurate assessment is planned to be implemented in the future.	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.) From the end of August, the implementation of decontamination operations has begun.		

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# 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 (around 3 to 6 months after achieving Step1)>: 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 Sep. 20)	
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 and implementation of reinforcement work of each Unit [Countermeasure 71]</b></p> <ul style="list-style-type: none"> <li>- Evaluation of seismic resistance has been completed (Aug.26)</li> <li>- Investigation inside the building is planned after countermeasures to reduce radiation dose achieved</li> </ul>	Target [9] Mitigation of disasters
		Continue various countermeasures for radiation shielding [Countermeasure 73]	
V. Environment improvement	(8) Living / working Environment	<p><b>Continuation and enhancement of improvement of workers' living / working environment [Countermeasure 75]</b></p> <ul style="list-style-type: none"> <li>- Accommodations for approx. 1,600 people have been prepared. Approx. 1,100 people have already moved in (as of Sep. 11)</li> <li>- Seventeen on-site rest station have been established (approx. 3,400m<sup>2</sup> in size with a capacity to accommodate approx. 1,200 people) (as of Sep. 9)</li> </ul>	Target [8] Enhancement of environment of improvement
	(9) Radiation control / Medical care	<p><b>Continuous improvement of radiation control [Countermeasure 78]</b></p> <ul style="list-style-type: none"> <li>- Reinforcement of radiation control by NISA</li> <li>- Expansion of whole-body counters, implementation of monthly internal exposure measurement</li> <li>- Automated recording of personal radiation dose, written notification of exposure dose , introduction of workers' certificates with photos</li> <li>- Consideration of long-term healthcare such as enhancement of safety training for workers and establishing database etc.</li> </ul>	Target [9] Enhancement of healthcare
		<p><b>Continuous reinforcement of medical system [Countermeasure 80]</b></p> <ul style="list-style-type: none"> <li>- Install new emergency medical facility, establish organization with resident specialists (on call 24 hours a day), speedy transportation of patients</li> <li>- Intensive preventive measures against heat stroke (trainings for new workers), countermeasures for mental health and conducting medical examination</li> <li>- Establish industrial hygiene system such as preventive healthcare</li> </ul>	
(10) Staff Training / personnel allocation	<p><b>Systematic staff training and personnel allocation [Countermeasure 85]</b></p> <ul style="list-style-type: none"> <li>- Promote human resources training in cooperation with the government and operators</li> </ul>	Target [10] Exhaustive radiation dose control	

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