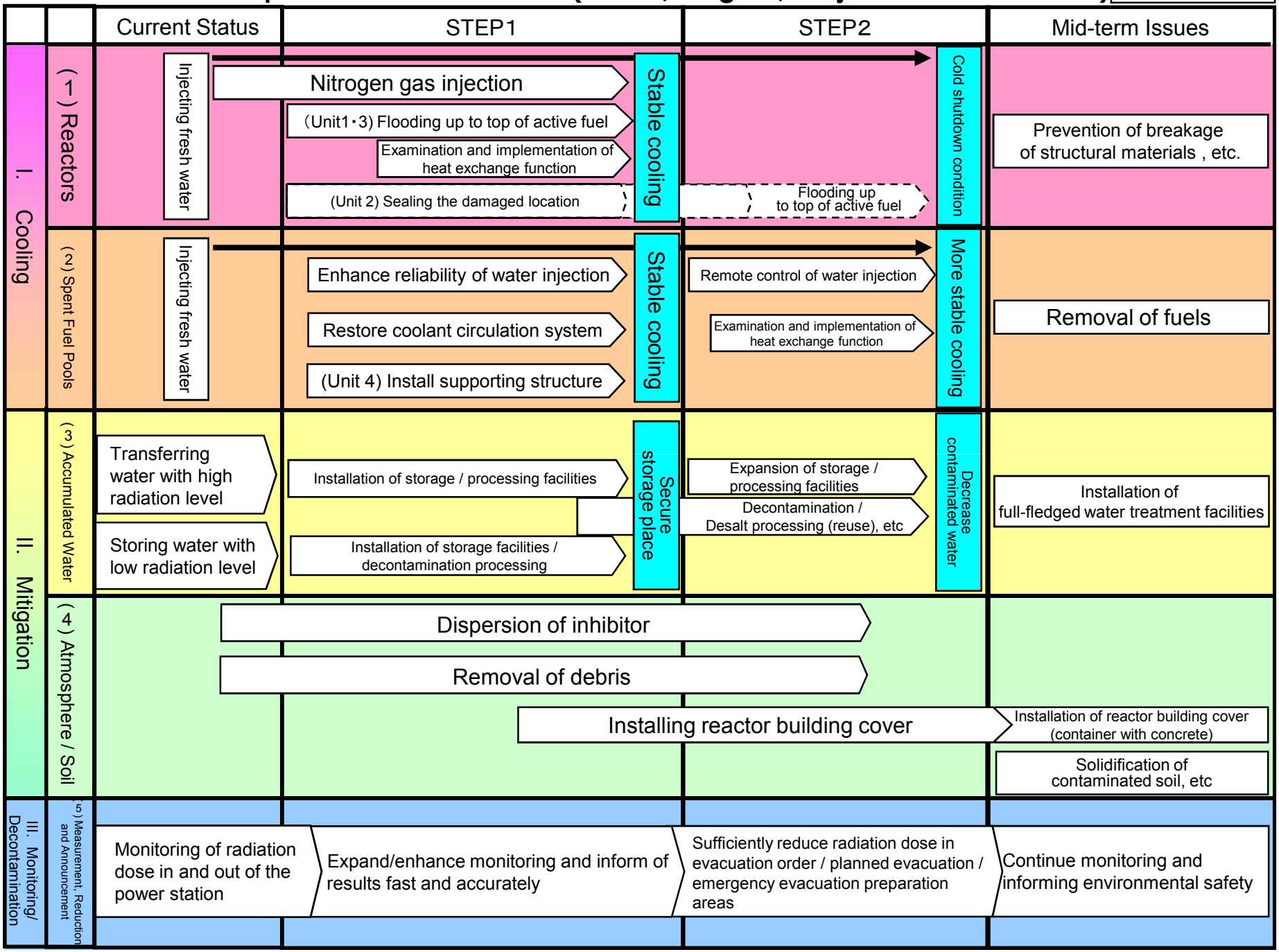
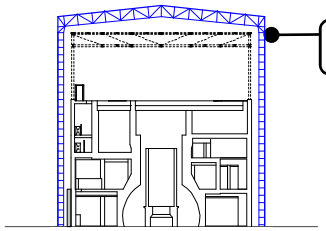
Roadmap for Immediate Actions (Issues / Targets / Major Countermeasures)

Reference 1



Overview of Major Countermeasures in the Power Station

Reference 2



Reactor building cover (countermeasures 5, 50, 54, 55)

Cooling of spent fuel pool by external water injection (countermeasures 18, 22, 28)

Sampling of steam/pool water and measurement of radioactive materials (countermeasure 19)

Storage of low radiation-level water (countermeasures 33, 35, 40)

Tanks, Megafloats, Barges, Reservoir

Nitrogen gas injection (countermeasures 2, 11, 15)

Reactor Building

Circulation cooling of spent fuel pool (countermeasures 23, 24, 25, 27)

Processing high radiation-level water (countermeasures 31, 38, 43)

Tank

Water processing facility (Decontamination and desalt processing)

Tank Lorry

PCV venting (with filtration) (countermeasure 10)

Primary Containment Vessel (PCV)

Reuse of processed water (Countermeasure 45)

Storage of high radiation-level water (countermeasures 30, 32, 37, 39, 42)

Flooding up to top of active fuel (countermeasures 3, 9)

Reactor Pressure Vessel (RPV)

Turbine Building

Steam Turbine

Heat Exchanger

Additionally-installed Tank

Centralized Waste Treatment Building

Installation of heat exchangers (countermeasure 13)

Condenser

Injection of fresh water with pumps (countermeasure 1)

Suppression Chamber

(Unit 2) Sealing the damaged location (countermeasures 6, 16)

Dispersion of inhibitor (countermeasures 47, 48, 52)
Removal of debris (countermeasures 49, 53)
Consideration of countermeasures for contaminated soil (countermeasure 51)

Preventive measures against leakage of high radiation-level water (countermeasure 29)

Treatment of sub-drainage water after being pumped up (countermeasure 36)

Seismic assessment (countermeasure 20),
Continued monitoring (countermeasure 21),
(Unit 4) Installation of supporting structure under the bottom of spent fuel pool (countermeasure 26)

piping

pumps

heat exchangers, water processing facilities

Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station

April 17th, 2011
Tokyo Electric Power Company

With regard to the accident at Fukushima Daiichi Nuclear Power Station due to the Tohoku-Chihou-Taiheiyo-Oki Earthquake occurred on Friday, March 11th, 2011, we are currently making our utmost effort to bring the situation under control. This announcement is to notify the roadmap that we have put together towards restoration from the accident.

1. Basic Policy

By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

2. Targets

Based on the basic policy, the following two steps are set as targets: “Radiation dose is in steady decline” as “Step 1” and “Release of radioactive materials is under control and radiation dose is being significantly held down” as “Step 2.” Target achievement dates are tentatively set as follows: “Step 1” is set at around 3 months and “Step 2” is set at around 3 to 6 months after achieving Step 1.

3. Immediate Actions

Immediate actions were divided into three groups, namely, “I. Cooling”, “II. Mitigation”, “III. Monitoring and Decontamination.” For the following five issues—“Cooling the Reactors,” “Cooling the Spent Fuel Pools,” “Containment, Storage, Processing, and Reuse of Water Contaminated by Radioactive Materials (Accumulated Water),” “Mitigation of Release of Radioactive Materials to Atmosphere and from Soil,” and “Measurement, Reduction and Announcement of Radiation Dose in Evacuation Order/Planned Evacuation/ Emergency Evacuation Preparation Areas”—targets are set for each of the five issues and various countermeasures will be implemented simultaneously.

Please see the attachment for detailed actions.

We would like to deeply apologize again for the grave inconvenience and anxiety that the broad public has been suffering due to the accident at the Fukushima Daiichi Nuclear Power Station. We will continue to make every endeavor to bring the situation under control.

April 17, 2011

Tokyo Electric Power Company

Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station

1. Basic Policy

By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

2. Targets

- Based on the basic policy, the following two steps are set as targets:
  Step 1: Radiation dose is in steady decline.
  Step 2: Release of radioactive materials is under control and radiation dose is being significantly held down.
  (Note) Issues after Step 2 will be categorized as "Mid-term Issues"
- Target achievement dates are tentatively set as follows, although there will still be various uncertainties and risks:
  Step 1: around 3 months
  Step 2: around 3 to 6 months (after achieving Step 1)
  (Note) Announcements will be made as soon as timing of step-wise target achievement or quantitative prospects are determined, as well as if revisions to the targets or achievement dates become necessary.

3. Immediate Actions

- In order to achieve the above targets, immediate actions were divided into 3 groups with targets set for each of the 5 issues. Various countermeasures will be implemented simultaneously (see the table in right.)
- In order to achieve Step 1, overcoming the following two issues that are currently being addressed will be critical:

① Prevention of hydrogen explosion inside the primary containment vessel (hereafter, PCV) (Units 1 to 3.)

・ Cooling the reactor by injecting fresh water into the reactor increases the chance of steam condensation, leading to a concern of potentially triggering a hydrogen explosion.

→Nitrogen gas will be injected into the PCV of each unit to keep the concentration of hydrogen and oxygen below flammability limit.

② Prevention of release of contaminated water with high radiation level outside of the site boundary (Unit 2.)

・ While cooling the reactor by injecting fresh water, accumulation of contaminated water with high radiation level in the turbine building is increasing (possible release to outside of the site boundary.)

→Actions will be taken against accumulated water to (1) secure several storage places and (2) install facilities to process the contaminated water and reduce the radiation dose, among others.

Roadmap for Immediate Actions

Areas	Issues	Targets and Countermeasures	
		Step 1	Step 2
I. Cooling	**(1) Cooling the Reactors**	**① Maintain stable cooling** ・ Nitrogen gas injection ・ Flooding up to top of active fuel ・ Examination and implementation of heat exchange function **② (Unit 2) Cool the reactor while controlling the increase of accumulated water until the PCV is sealed**	**③ Achieve cold shutdown condition (sufficient cooling is achieved depending on the status of each unit.)** ・ Maintain and reinforce various countermeasures in Step 1.
	(2) Cooling the Spent Fuel Pools	**④ Maintain stable cooling** ・ Enhance reliability of water injection ・ Restore coolant circulation system ・ (Unit 4) Install supporting structure	**⑤ Maintain more stable cooling function by keeping a certain level of water.** ・ Remote control of coolant injection operation ・ Examination and implementation of heat exchange function
II. Mitigation	**(3) Containment, Storage, Processing, and Reuse of Water Contaminated by Radioactive Materials (Accumulated Water)**	**⑥ Secure sufficient storage place to prevent water with high radiation level from being released out of the site boundary.** ・ Installation of storage / processing facilities. **⑦ Store and process water with low radiation level** ・ Installation of storage facilities/decontamination processing.	**⑧ Decrease the total amount of contaminated water.** ・ Expansion of storage/processing facilities. ・ Decontamination/Desalt processing (reuse), etc.
	(4) Mitigation of Release of Radioactive Materials to Atmosphere and from Soil	**⑨ Prevent scattering of radioactive materials on buildings and ground** ・ Dispersion of inhibitor ・ Removal of debris ・ Installing reactor building cover	**⑩ Cover the entire buildings (as temporary measure).**
III. Monitoring/ Decontamination	**(5) Measurement, Reduction and Announcement of Radiation Dose in Evacuation Order/Planned Evacuation/ Emergency Evacuation Preparation Areas**	**⑪ Expand/enhance monitoring and inform of results fast and accurately** ・ Examination and implementation of monitoring methods.	**⑫ Sufficiently reduce radiation dose in evacuation order / planned evacuation / emergency evacuation preparation areas** ・ Decontamination/monitoring of homecoming residences.
		(Note) With regard to radiation dose monitoring and reduction measures in evacuation order/planned evacuation/emergency evacuation preparation areas, we will take every measure through thorough coordination with the national government and by consultation with the prefectural and municipal governments.	