

Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (as of March 2020)

March 4, 2020
Nuclear Regulation Authority Japan

Issues for Risk Reduction and appropriate conditions

Issue	
Liquid radioactive materials	<ul style="list-style-type: none"> Progress the treatment of stagnant water containing α nuclides in buildings and maintain as drainage completed area except for reactor buildings Decrease rainwater and groundwater flowing into buildings to prevent stagnant water in buildings from increasing, and complete the treatment of all stagnant water Decrease water in S/C of Unit 1 and 3 to the level at which the water will not leak out of the buildings
Spent fuel	<ul style="list-style-type: none"> Complete removing all fuels from spent fuel pools of Unit 1, 2, 3, 5 and 6 Establish additional dry storage cask area and secure spent fuel storage capacity Store fuels which are stored in common pool, in dry storage casks as far as possible
Solid radioactive materials	<ul style="list-style-type: none"> Remove high-dose zeolite sandbags remaining in Process Main Building, etc. and store stably Store spent Cesium adsorption vessel stably in facilities, and stabilize ALPS slurry for storage Proceed with reducing the volume and incineration of solid waste such as rubble to reduce the amount of solid waste and eliminate temporary storage outside Store other solid radioactive materials in more safely manner Install facility to analyze fuel debris and other solid radioactive materials and secure proper staffing and capacity Take safety measures in removing fuel debris and store debris in stable status
Countermeasures for external events	<ul style="list-style-type: none"> Seal outer wall of buildings and restrain inflow of groundwater into buildings significantly Repair damaged parts such as building roof to prevent rainwater inflow Take measures such as blocking the openings of buildings to prevent stagnant water from flowing out or increasing by tsunami Take measures in accord with deterioration and damage level of building structures, etc.
Important issues to progress decommissioning	<ul style="list-style-type: none"> Reinforce structure to progress risk reduction swiftly and strengthen quality management Reduce radiation doses by removal of high-dose radiation sources such as lower part of Exhaust stack of Unit 1 and 2 or shielding against them, and take measures for suppressing dust scattering during operation inside R/B Handle the ALPS treated water (e.g. Discharge into the sea)

Based on the above, set individual goals



Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (Main Goals)

Issue	Liquid radioactive materials	Spent fuel	Solid radioactive materials	Countermeasures for external events	Important issues to progress decommissioning
Fiscal year	11, 12	21, 22	31, 32	41, 42	
2020	11 Dry up T/B 12 Approach toward stopping water injection to reactor	21 Fuel removal from Unit 3 22 Design of shielding related to fuel removal from Unit 2, etc.	31 Install additional incinerator 32 Examine measures to stabilize zeolite in Process Main Building, etc.	41 Repair building roof [rainwater] 42 Dismantle upper part of exhaust stack of Unit 1 and 2 [earthquake]	Reinforce quality management structure of Decommissioning Project Start facility inspection by licensee (long-term maintenance) Improve workplace environment continuously
2021	13 Establish the method to remove α nuclides in stagnant water in buildings 14 Advanced approach to decrease the water level in S/C of Unit 1 and 3	23 Start fuel removal from Unit 5 or 6 (Timing has not been decided) 24 Start installation of additional dry storage casks	33 Install large waste storage facility (Cs adsorption vessel) 34 Install ALPS slurry (HIC) stabilization facility	43 Block the openings of buildings, etc. [tsunami] 44 Transfer sludge from decontamination instrument [tsunami]	Retrieve fuel debris from Unit 2 experimentally and investigate inside PCV and analyze debris Operate analysis facility on full-scale and build up structure for analysis Dose reduction under high-dose environment Take measures to suppress dust scattering from buildings, etc. Remove high-dose SGTS pipes in lower part of exhaust stack of Unit 1 and 2, etc.
2022	15 Process untreated water in tanks	25 Provide shielding in Unit 2 R/B Operating Floor and suppress dust scattering	35 Install volume reduction facility and 10th solid waste storage facility	45 Widen the paving area around buildings [rainwater]	Handle the ALPS treated water (e.g. Discharge into the sea) (Timing has not been decided)
Further future goals 2023 ~ 2031	16 Transfer and treat stagnant water in R/B as far as possible 17 Dry up Process Main Building, etc. 16 Treat all stagnant water in R/B	26 Install Unit 1 R/B cover 24 Expand dry storage cask area to install additional dry casks 27 Fuel removal from Unit 1 and 2 23 Fuel removal from spent fuel pool of all units	32 Control zeolite in Process Main Building, etc. in safe state 36 Remove rubble stored outside 37 Control waste in safer and more stable state	46 Prevent deterioration and maintain soundness of buildings Seal outer wall of buildings [groundwater]	

※Numbers correspond to those in "Distribution of radioactive materials" (Attachment 1 and 2)

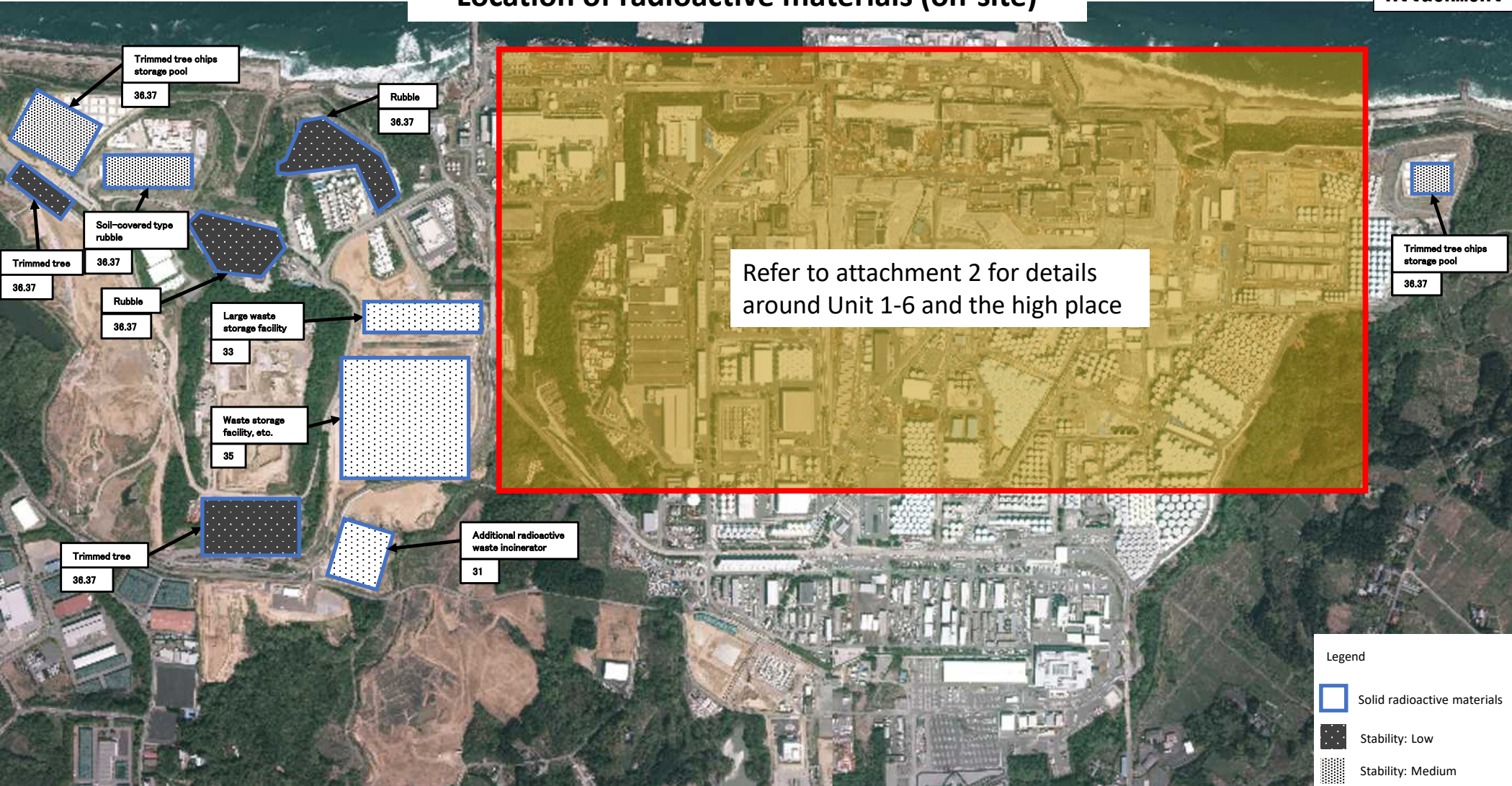
Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (Other Tasks) 1/2

○ Liquid radioactive materials	Timing	
To be conducted	Treat strontium removed water	Within 2020
Timing has not been decided	Remove contaminated water in trenches, etc. Remove underground cisterns	
○ Spent fuel		
Timing has not been decided	Treat the well plug of Unit 1 R/B Operating Floor and remove rubble Remove spent control rods	
○ Solid radioactive materials		
To be conducted	Install temporary storage facilities for contaminated soil Install additional incineration facilities Install Radioactive Material Analysis Facility (building No.1)	Within FY 2020 Within FY 2020 Within FY 2021
Timing has not been decided	Install stabilization equipment for sludge from decontamination instrument	

Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (Other Tasks) 2/2

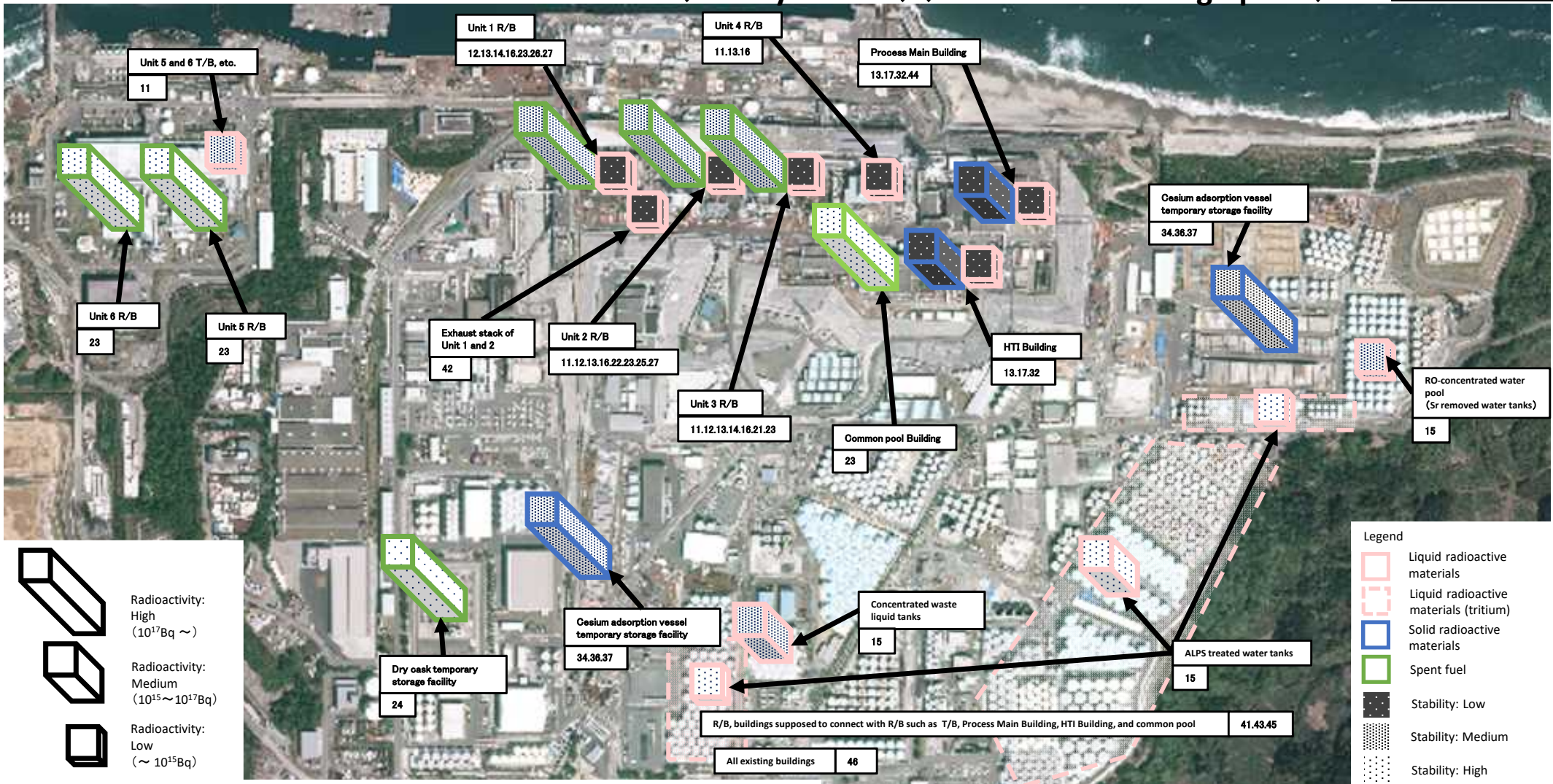
○ Countermeasures for external events		Timing
To be conducted	Take measures for Mega-Float	Within FY 2020
	Install tide embankment against Chishima-trench Tsunami	Within FY 2020
	Restrain the inflow of rainwater into Unit 3 Turbine Building	Within FY 2020
	Restrain the inflow of rainwater into radioactive waste treatment buildings of Unit 1 and 2	Within FY 2021
○ Important issues to progress decommissioning		
To be conducted	Survey the contamination status inside the reactor buildings, etc. (nuclide analysis, etc.)	After FY 2020
	Grasp the properties and characteristics of the cooling water after the reactors have cooled down (nuclide analysis, etc.)	After FY 2020
	Analyze the flow of contaminated water inside the reactor buildings, etc.	After FY 2020
	Directly observe inside the containment vessel and pressure vessel	After FY 2020
Timing has not been decided	Remove rubble around the buildings	
	Reduce concentration of radioactive materials in the water of drainages	
To be considered necessary or not	Improve the environment of ground level 2.5m	

Location of radioactive materials (on-site)



- * Rubble is managed based on dose rates, so stability is determined by storage status. (e.g. Low: In the open air, Middle: Storage pool or soil-covered storage, High: Storage facility)
- * Numbers correspond to those in “Measures for Mid-term Risk Reduction at TEPCO’s Fukushima Daiichi NPS (Main Goals)”

Location of radioactive materials (Mainly Cs-137) (Unit 1-6 and the high place)



* Numbers correspond to those in "Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (Main Goals)"

* Fuel debris and high dose rubble are not noted because concrete measures are necessary to handle those.

* Radioactivity in each facility is Cs-137 radioactivity. Exceptionally, radioactivity in ALPS treated water tanks is the total of tritium (H-3) radioactivity and, in Concentrated waste liquid tanks and Sr removed water tanks, the total of strontium (Sr-90) radioactivity.

* Radioactivity in Unit 1-4 R/B is the total of Cs-137 radioactivity of stagnant water in R/B, Waste Treatment Building and T/B of each unit (except for Unit 1 T/B).

* Contaminated water outside R/B exists in wide range including ground level 2.5m, however, total amount of radioactivity is low, so exhaust stack of Unit 1 and 2 is selected as representative.

Cited from aerial photograph taken by Geographical Survey Institute in 2018

Progress on the previous Risk Map

Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (as of March 2019)

March 6, 2019
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