Initiatives for Ensuring Safety in Nuclear Power Stations

April 2013



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1 Effort for New Regulatory Requirements

In light of the lesson from the accident at the Fukushima Daiichi Nuclear Power Station and overseas regulatory trend, Nuclear Regulation Authority officially announced a draft gist of New Regulatory Requirements on February 6, 2013 including strengthening of the traditional safety standards and the measures against severe accident.

On April 3, Nuclear Regulation Authority announced a gist of New Regulatory Requirements based on public comments. New Regulatory Requirements will be promulgated and enforced by July 18, 2013 as the rule of Nuclear Regulation Authority based on The Nuclear Reactor Regulation Law.

[Policy in Preparing New Regulatory Requirements]

- Place emphasis on Defense-in-Depth concept
- Eliminate common cause failures
- Assess and enhance protective measures against extreme natural hazards



[Image of New Regulatory Requirements]

1 (2) Major Requirements of a Gist of New Regulatory Requirements

Basis		Major Requirements	
	Denis Terreni		Define "Design Basis tsunami" that has the largest impact on the facilities
	Earthquake and Tsunami	Basis Isunami	Protective facilities against tsunami such as seawall are constructed (quake-resistance standards is S-class)
		Active Fault	The facilities having an important safety function should not be constructed on the exposure of active faults
			Active faults with activities later than the Late Pleistocene (later than 120,000-130,000 years ago) be considered for seismic design Activities in the Middle Pleistocene (later than 400,000 years ago) be further investigated if needed
		Natural Phenomenon	Additional of tornado, volcano and forest fire
		Fire	Reinforcement of fire protection measures
Design Basis		Reliability	Designing with multiplicity or variety and independence
Rein	forced	Power Source	Strengthening of an external power source (connection to different substations through multiple lines) Continuous running of an emergency diesel generator (for seven days)
		Cooling Facilities	Protection of system for releasing heat (protection of seawater pumps, etc.)

1 (2) Major Requirements of a Gist of New Regulatory Requirements

Basis		Major Requirements		
	Prevention of Core Damage	Measures for Shutdown Failure	Measures for anticipated transient without scram	
		Cooling and Depressurization	Measures for losing a cooling function of nuclear reactor Measures for losing a depressurization function of nuclear reactor Ensuring of ultimate heat sink (the place for releasing ultimate heat)	
		Water and Power Source	Ensuring of support function (makeup water, power source)	
Severe Accident Measures	Prevention of Containment Vessel Failure	Cooling and Depressurization	Cooling and depressurization of atmosphere in containment vessel, reduction of radioactive materials Heat removal from containment vessel and depressurization of containment vessel	
		Cooling of Molten Core	Cooling of molten core at the bottom of containment vessel and inside reactor pressure vessel	
		Hydrogen Explosion	Prevention of hydrogen explosion inside containment vessel	
	Suppression of Radioactive Materials Dispersion and Management Function of Plant	Suppression of Dispersion	Suppression of radioactive materials dispersion in case of containment vessel failure	
		Spent Fuel Storage Pool	Cooling at spent fuel storage pool	
		On-site Emergency Response Center	Preparation of facilities that maintains function as a local headquarter	
		Specialized Safety Facility	Preparation of specialized safety facility which is available in the case of terrorism such as intentional aircraft crash	

1 (3) Major Measures Required in New Regulatory Requirements (Image)

O Kyushu Electric Power will respond quickly and appropriately to "New Regulatory Requirements" is formulated by Nuclear Regulation Authority and make assurance doubly sure on the safety measures of nuclear power station.



2 Safety Measures of Our Nuclear Power Stations

2 (1) Overview of Safety Measures

In light of lessons learned from the accident at Fukushima Daiichi Nuclear Power Station, we have been implementing the emergency safety measures, etc. based on the instruction from the Japanese government.

We have been taking voluntary, ongoing steps with our sights set on achieving even greater safety and enhanced reliability.

	Substance	Situation of the response
The emergency safety measures	 Immediately after the accident at Fukushima, we received the instruction of the government and implemented the emergency safety measures. High-voltage Generator Truck, Deployment of temporary pumps and hoses, etc. 	Completed in April 2011
Measures concerning the response to severe accident	We received the instruction of the government and implemented measures to correspond promptly when a severe accident occurred by any chance. • Deployment of a Rubble Clearing Vehicle, etc.	Completed in June 2011
Medium-and long-term measures	We are taking voluntary Medium-and long-term measures with our sights set on achieving even greater safety.Deployment of Portable Large Generator, etc.	In practice (partly completed)
Measures for attaining greater safety and reliability	Please refer to next page.	

2 (2) Overview of Measures for Attaining Greater Safety and Reliability

- o We have been reviewing and designing as voluntary initiatives aimed at enhancing safety and reliability even further for ensuring trust in nuclear power.
 - (Voluntary initiatives based on technological insights emphasized by the government)

Moasuros		Scheduled Completion Date				
	Weasures	Sendai	Genkai			
1.	1. Measures of Power Supply Facility					
	Additional Deployment of Emergency Generator	under consideration	under consideration			
	Ensuring Reliability of External Power Supply	in FY2019	in FY2013			
	Enhancement of Storage Battery Capacity	under consideration	under consideration			
	Permanent Deployment of Power Cable for Connecting with Portable Large Generator	completed (in September 2012)	completed (in March 2013)			
2. Measures of Cooling and Pouring Water						
	Measures for Waterproof in Seawater Pump Area	in FY2014	in FY2014			
	Development of Potable Large Pumping Vehicle	in the first six months of FY2013	in FY2013			
	Diversifying Power Sources of Air Operated Valves	in the first six months of FY2013	in FY2014			
	Strengthening Cooling Ability of Spent Fuel Storage	in FY2014	in FY2014			

2 (2) Overview of Measures for Attaining Greater Safety and Reliability

Measures		Scheduled Completion Date			
		Sendai	Genkai		
3. Preventive Measures of Breaking Containment Vessel					
	Installation of Ventilation Systems with Containment Vessel Filters	in FY2016	in FY2016		
	Strengthening Measures Releasing Hydrogen in Containment Vessel	in the first six months of FY2013	in FY2014		
4.	4. Other Measures				
	Strengthening Monitoring of Spent Fuel Storage Area	under consideration	under consideration		
	Constructing New Buildings with a Seismic Isolation Structure	in FY2015	in FY2015		
	Additional Deployment of Heavy Equipment	completed (in March 2013)	completed (in March 2013)		
	Maintenance and Improvement of High Ground in Power Station for Tsunami Countermeasures	implementation according to each measures (,)	implementation according to each measures (,)		
	Adoption of Heatproof Seal for Primary Coolant Pump	in FY2013-FY2014	under consideration		
	Strengthening Nuclear Disaster Prevention (improvement of general hub function, etc)	completed (in March 2013)	completed (in March 2013)		
	Strengthening Measures against Terrorism	in March 2014	in March 2014		

2 (2) Overview of Measures for Attaining Greater Safety and Reliability



We doesn t describe construction figure of "strengthen measures against terrorism", for the purpose of physical protection management.

Reference

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o Based on deliberations in a hearing about the earthquake and the tsunami, Nuclear and Industrial Safety Agency is evaluating the fault on the premises of Genkai and Sendai Nuclear Power Station as follows.

- Because the fault has finished acting millions of years ago, it is not an active fault though there is a fault (fracture zone) on the premises.
- There is no active fault near the premises, the fault on a premises is dragged, and it does not move.
- There is no active fault which should be considered an interlock around the premises of Genkai Nuclear Power Station. At Sendai Nuclear Power Station, we are giving proper consideration to interlock, there is no active fault which should be considered it newly.

(Reference 2) Locational Characteristic of Our Nuclear Power Station (Effect of Tsunami)

Tsunami brought enormous damage such as Tohoku earthquake generated around plate boundary



Our nuclear power stations are insulated from the influence of tsunami, because there is no plate boundary in East China Sea which faces our nuclear power stations, and also the water depth is shallow.

And Depth of the water is based on data

of "National Geophysical Data Center"

(Reference 2) Locational Characteristic of Our Nuclear Power Station (Effect of Tsunami) 11



This figure based on "J-EGG500(JODC-Expert Grid data for Geography-500m) published by Japan Oceanographic Data Center , Hydrographic and Oceanographic Department "

(Reference 2) Locational Characteristic of Our Nuclear Power Station (Effect of Tsunami) 12



We had ascertained to be sure not to impact to the site of Genkai PS from estimation assumed the M8 earthquake which is the largest interplate earthquake ever in Japan occurred in plate of the sea around Genkai PS. (about 4.9m above sea level)

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