Actions We Have Taken Regarding the Kashiwazaki-Kariwa Nuclear Power Station and Establishment of the Design-basis Seismic Motion

The Tokyo Electric Power Co., Inc.

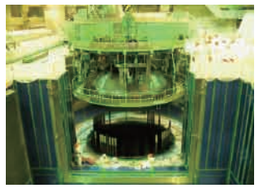
1.Important facilities were unaffected by the seismic motion of the Niigata-Chuetsu-Oki Earthquake.

- At about 10:13 a.m. on July 16, 2007, an earthquake of 6.8 on the Richter scale with an epicenter located at Chuetsu offshore occurred. However, all nuclear reactors at the NPS safely shut down.
- At the NPS, automatic safety functions of shutdown, cooling, and containment worked as designed immediately after the quake, and all nuclear reactors shut down safely.
- We would like to apologize to the local residents for the anxiety caused by the fire from the electric transformer, the water leakage from the spent fuel pool, the discharge of a small amount of radioactive material from the exhaust gas of the turbine shaft seal part, and the delay in communication.
- We are in the process of revamping our crisis management system such as fire protection, radioactive management, and communication.
- We are currently expanding our self-defense fire brigade that can respond around the clock, deploying chemical fire engines and pumper trucks, reinforcing fire hydrants and piping, and installing and improving quake-proof fire protection tanks.
- We increased the number of radiation measurement staffs and established a system that allows for quick and accurate examination even during non-business days and holidays and during nights.
- We revised and thoroughly communicated the Operation Manual during Emergency Shutdown.
- We will construct the Emergency Response Center on a quake-absorbing structure.
- We reinforced the infrastructure, system, and organization for communication.
- We will utilize public announcement vehicles and local radio stations to communicate information to local residents at a time of emergency.
- We will promptly dispatch personnel from our management to the NPS at a time of disaster in order to support communication with local residents.
- We are examining facilities and restoring damaged parts.
- We have completed visual inspections and functional tests of safety-significant facilities such as those inside of nuclear reactors and emergency diesel generators, and confirmed that they are intact.
- We are implementing detailed inspections on turbines and peripheral equipment using ultrasonic and magnetic testing methodology.
- We are restoring and reinforcing discharge channels of units 6 and 7, which have been confirmed to have cracks, among other facilities.
- In order to secure passage of fire trucks, we will implement anti-road submerging measures and reinforcement of slopes.
- With regard to the submergence that induced a transformer fire, we will implement a pile foundation construction.
- The filtered water tank, which will also be used for fire fighting purpose, will be reinforced with a higher standard applied for oil tanks.
- Important facilities possessed more than three times the quake-resistance strength of general buildings required in the Building Standards Law, and in fact remained intact despite the earthquake.
- The quake of Niigata-Chuetsu-Oki Earthquake exceeded the dynamic design-basis seismic motion, but the quake-generated force applied to safety-significant facilities was about the same as the design basis taking into account static seismic force.
- Safety-significant facilities possessed sufficient design margin that kept the facilities and their safety functions intact.

Training of the self-defense fire brigade

Dispatch training of management during an emergency

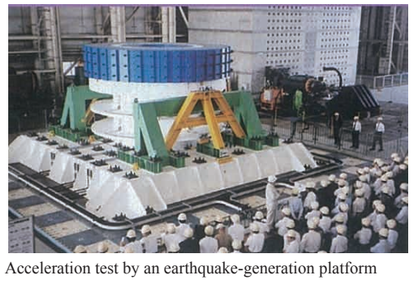
Quake-resistant fire-prevention tank



In-core inspection

Inspection of the turbine

Rebar assembly of the base mat of the reactor building

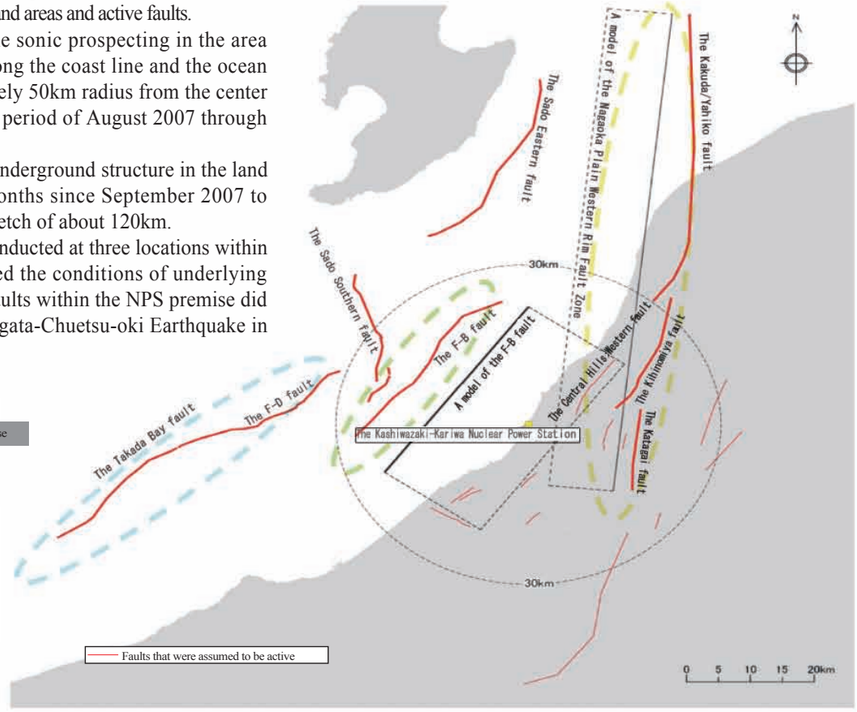


Acceleration test by an earthquake-generation platform

2. We surveyed the geology and soil foundation, and identified active faults that would affect the NPS.

- We reported results of the survey to government committees, and cautiously investigated while having experts confirm the results.
- The interim report regarding the survey results and the identified active faults was submitted to the Nuclear and Industrial Safety Agency, and is made available to the public on the TEPCO website and through briefings for local residents.
- We thoroughly surveyed sea and land areas and active faults.
- We have conducted a maritime sonic prospecting in the area stretching for about 140km along the coast line and the ocean area covered by an approximately 50km radius from the center of the NPS premise during the period of August 2007 through November 2007.
- With regard to exploration of underground structure in the land area, we spent about seven months since September 2007 to investigate areas with a total stretch of about 120km.
- Shaft excavation survey was conducted at three locations within the NPS premise. We observed the conditions of underlying faults and confirmed that old faults within the NPS premise did not move at the time of the Niigata-Chuetsu-oki Earthquake in 2007.

Shaft excavation survey within the premise



- Based on the results of our geological investigation, we selected active faults that need to be taken into consideration in determining the design-basis seismic motion.
- The scale of assumed earthquakes becomes larger by postulating that active faults are longer and that multiple active faults would move simultaneously. By erring on the side of safety when findings are uncertain, we made strict evaluations.

Active faults that were selected as potentially affecting the NPS, based on the results of geological survey

Active faults		Length of faults	Magnitude of earthquakes (*1)		Notes
the F-B fault		About 34km (*2) (About 27km)	34km	Magnitude 7.0 in Richter scale	The total length of the fault was assessed to be about 34km from a safety-conservative point of view.
the Nagaoka Plain Western Rim Fault Zone	the Kakuda/ Yahiko fault	About 54km	91km	Magnitude 8.1 in Richter scale	These faults were postulated to move simultaneously from a safety-conservative point of view.
	the Kihinomiya fault	About 22km			
	the Katagai fault	About 16km			
the F-D fault		About 30km	55km	Magnitude 7.7 in Richter scale	These faults were postulated to move simultaneously from a safety-conservative point of view
the Takada Bay fault		About 25km			

Note 1: For the F-B fault, the magnitude was determined by the size of the assumed fault surface at the hypocenter and the correlation between the magnitude and the size of the fault surface at the hypocenter of the Niigata-Chuetsu-Oki earthquake. For other faults, the scale of magnitude was determined by the length of ground surface faults using the formula of Matsuda (1975).

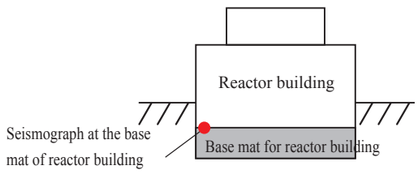
Note 2: Based on TEPCO's survey, the length of the fault was 27km, however, we postulated its total length to be about 34km from a safety-conservative point of view.

3.The Niigata-Chuetsu-Oki Earthquake was this kind of quake.

● Major features of the Niigata-Chuetsu-Oki Earthquake

・Acceleration observed on the base mat of reactor buildings of units 1 to 4, measuring from 680 to 384 Gal, differed significantly from that of units 5 to 7, measuring from 442 to 322 Gal.

・The quake of Niigata-Chuetsu-Oki Earthquake exceeded the calculated values derived from conventional empirical methods.



●Elucidation of the earthquake generation and propagation mechanism unique to the NPS premise and its factors.

・As a result of our analyses of the post-Niigata-Chuetsu-Oki Earthquake geological survey, data from the 2007 Niigata-Chuetsu-Oki Earthquake, and past earthquake data from the 2004 Chuetsu Earthquake, it became clear that there are factors that intensifies seismic motions in this area. On the other hand, seismic motions become weaker from the free surface of the base stratum to the reactor buildings due to the building structure embedded in the ground.

[Factors that contribute to intensification of seismic motions.]

(1) A hypocenter that generates larger-than-normal quakes (about 1.5 times larger);

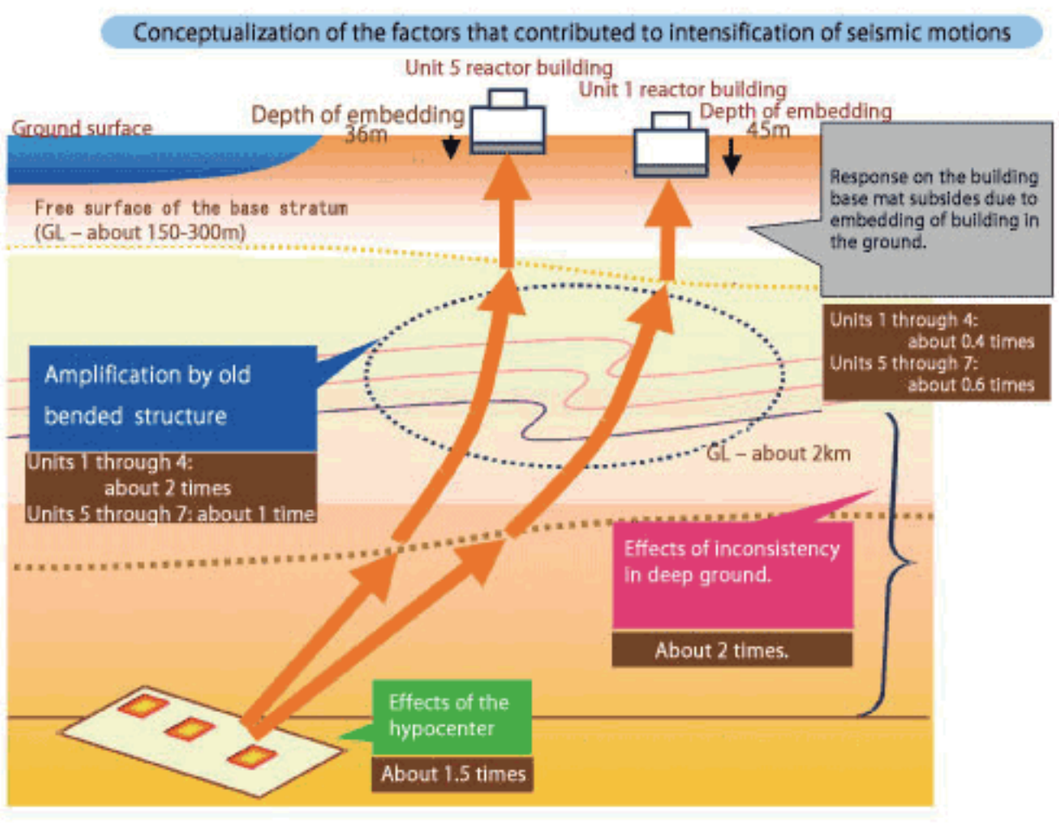
(2) In deep ground, while the seismic motion reaches the ground with slow propagation speed, subsequent motions catch up with the first motion, thereby intensifying the seismic motions (about two times in seismic motions for those from the ocean side).

(3) Due to the old folded structure in the ground, seismic motions bend and become intensified (about 2 times the original scale on the side of units 1 through 4).

[Factors that contribute to weakening of seismic motions.]

(4)Seismic motions become weaker from the free surface of the base stratum to the reactor buildings due to the building structure embedded in the ground (about 0.4 times the original scale on the side of units 1 through 4, and 0.6 times on the side of units 5 through 7).

The newly discovered mechanism was reflected in determining the design-basis seismic motion.



4. We formulated a new design-basis seismic motion.

●Selection of active faults that significantly affects the NPS.

・As a result of the active fault survey, we selected the following as earthquakes that would significantly impact the NPS premise: on the ocean side, an earthquake generated by the F-B fault, and on the land side, an earthquake generated by the Nagaoka Plain Western Rim Fault Zone.

・In evaluating potential impact of such earthquakes on the NPS premise, we considered the earthquake generation and propagation mechanism unique to the Niigata-Chuetsu-Oki Earthquake.

●Formulation of the design-basis seismic motion.

・For each of the two selected earthquakes, we used the response spectrum method (*1) and the fault model method (*2).

・We determined seismic motions on four open foundation surface and selected the maximum value as the design-basis seismic motion.

Note 1: Response spectrum method: A method of evaluating seismic motion at a selected location by identifying the scale of the earthquake, the distance from the hypocenter, and by using empirical formula.

Note 2: Fault model method: A method of evaluating seismic motion at a selected location by formulating a model of fault surface movement and destruction.

●Evaluation of seismic motion at the base mat of reactor buildings.

・The design-basis seismic motion is a motion at an underground location of 150m to 300m under the so-called free surface of the base stratum. In order to design earthquake resistance of nuclear power station facilities, it is important to consider seismic motion at the base mat of reactor buildings.

・For each unit, we calculated how the design-basis seismic motion attenuates before reaching reactor buildings near the ground surface and established seismic motions on each base mat of reactor buildings.

Evaluation results of seismic motion at each unit

Values represent the larger of horizontal (east-west and south-north) axes. (unit: Gal)

Evaluated seismic motion	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit7
Niigata-Chuetsu-Oki Earthquake (observed value)	680	606	384	492	442	322	356
Response according to the design-basis seismic motion Ss (on the reactor base mat.)	829	739	663	699	543	656	642
Maximum value of the design-basis seismic motion Ss(on the free surface of the base stratum)	2280				1156		

・With regard to the design-basis seismic motion and the analysis of related earthquake observation data, we submitted a report to the Nuclear and Industrial Safety Agency on May 22, 2008.

5.We will take actions to further improve earthquake-resistance safety of the NPS.

・The design-basis seismic motion which we determined this time will be reviewed by the Nuclear and Industrial Safety Agency and review panels of the Nuclear Safety Commission. TEPCO will continue to confirm the earthquake-resistant safety of the NPS by taking the progress of the reviews into consideration.

・In order to improve the earthquake-resistant safety of the NPS, we will implement construction works so that all units will withstand a quake of 1,000 Gal, exceeding the maximum seismic motion response of 829 Gal at the reactor building base mat for units 1 to 7. For these works, we will also adequately reflect decisions made by the panels.

・We plan to widely communicate to the local community as well as to the public with regard to the situation of the Kashiwazaki-Kariwa Nuclear Power Station after Niigata-Chuetsu-Oki Earthquake, including the progress of the construction works to improve the earthquake-resistant safety of the NPS.