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**Information of Kashiwazaki-Kariwa Nuclear Power Station (The 6th news)  
- Update on the Overall Situation through to August 10 -**

This Report #6 summarizes the post-quake status of the Kashiwazaki Kariwa Nuclear Power Station and gives the overview of initiatives, trends and other details involving Tokyo Electric Power Company and other relevant organizations.

**1. Information on the earthquake (main shock)**

- (1)Date and time: 10:13 on Monday, July 16, 2007 (local time)
- (2)Hypocenter: Approximately 17km deep off the Upper Chuetsu region of Niigata Prefecture (The epicentral and hypocentral distance to the power station is 16km and 23km respectively.)
- (3)Scale of the earthquake: 6.8 on the Richter scale (measuring the maximum 6+ on the Japanese intensity scale in Nagaoka City, Kashiwazaki City and Kariwa Village in Niigata Prefecture and some parts of Nagano Prefecture)

**2. Post-quake status of the power station**

(1)Operation status

The earthquake correctly triggered the safety protection circuit, automatically shutting down Units 2 – 4 and Unit 7. The remaining Units 1, 5 and 6 had been shut down for outage.

Currently, all plants are shut down in a stable state, with no significant fluctuations in real-time data from the radiation monitors on main exhaust stacks and other monitoring posts, indicating no radiation-related impact on the surrounding environment.

(2)Seismic observation records at the power station

a. The table below shows the observation figures recorded on the lowest floor of each Unit’s reactor building (See Attachment 1), and design values for the same locations. The east-west component at Unit 1 registered the maximum acceleration of 680 gal. At Unit 2, the maximum acceleration recorded for the east-west component (observation figure: 606 gal) was 3.6 times the value anticipated in the design stage (design value: 167 gal).

(Unit: Gal)

Observation location	Observation figures recorded on the lowest floor of the reactor building			Design values for the same location		
	North-south component	East-west component	Up-down component	North-south component	East-west component	Up-down component
Unit 1	311	680	408	274	273	(235)
Unit 2	304	606	282	167	167	(235)
Unit 3	308	384	311	192	193	(235)
Unit 4	310	492	337	193	194	(235)
Unit 5	277	442	205	249	254	(235)
Unit 6	271	322	488	263	263	(235)
Unit 7	267	356	355	263	263	(235)

(Note)The up-down component figures in brackets are used in static design.

b. TEPCO analyzed seismic observation data obtained during the main shock of the recent earthquake, compiled the findings thus far into a report (Report #1) and submitted it to the Nuclear and Industrial Safety Agency on July 30. The content of the report was also publicly released.

<Released observation records>

>>The “acceleration time-history waveform” obtained during the main shock on the lowest floor of the reactor buildings at Units 1 to 7, and “maximum observed acceleration and maximum design acceleration response”

>>The comparison between the “floor response spectrum based on observation records” observed on the lowest floor of the reactor buildings at Units 1 to 7 and “floor response spectrum calculated based on the

standard seismic motion in the seismic response analysis model used in the design stage”

c. TEPCO will conduct seismic response analysis and anti-quake safety assessment on key facilities in terms of safety, based on the level seismic motion that would ensure safety against the intensity of the recent earthquake. It also plans to explore items to be reflected to future anti-quake safety assessment and anti-quake measures based on new knowledge obtained from this earthquake, including findings from active fault probes in sea areas and analysis of seismic observation data.

(3) Extent of damage at the power station

a. Main events confirmed in post-quake visual checks and their current status

(a) Overflow of water onto the reactor buildings' operating floors (All units)

>> Earthquake-induced sloshing caused an overflow of water containing radioactive materials from the spent fuel storage pools onto the operating floors of reactor buildings.

>> As of July 27, the water has been wiped away at all Units.

(b) Displacement of the ducts connected to the main exhaust stacks (Units 1 - 5)

>> No significant changes have been observed in monitoring post readings before and after the earthquake, with no confirmation of radiation influence to the external environment.

>> The size of the displacement and radiation leakage is currently under investigation.

(c) Flooding with 2,000 cubic meters of water in the Reactor Combination Building due to damage to the fire protection system's piping (Unit 1)

>> On the 5th basement floor of the Reactor Combination Building at Unit 1 (radiologically controlled area), the entire floor was flooded with water measuring 48 centimeters deep. The amount of water is estimated to be approx. 2,000 cubic meters, and a minute trace of radioactive materials was detected from the collected sample (approx. 6 becquerel/cc).

>> The cause of the incident is believed to be quake-damage to the outdoor piping of the fire protection system, which allowed water to enter into the building.

>> The basement floors of the Reactor Combination Building houses numerous devices associated with waste processing. However, unlike the basement of the reactor building, it does not contain important equipment in terms of reactor safety, such as pumps for the emergency core cooling system.

>> This piping for the fire protection system has been repaired, with no more water leakage. Work is underway to drain out the accumulated pool of water.

(d) Fire at the station transformer (Unit 3)

>> At 10:15, immediately after the earthquake, plant operators identified smoke coming from the station transformer at Unit 3. The Fire Department extinguished the fire at 12:10.

>> The site was subsequently examined, including a visual check, to confirm the following:

- There is a vertical displacement between the applicable transformer and its secondary connection bus.
- There is oil leakage from the bushing on the applicable transformer's secondary side.
- There are severe signs of burning at the connection duct to the transformer's secondary connection bus, with part of the bus having melted or fractured.

>> This transformer is currently unusable. However, a separate startup transformer is supplying enough electricity for maintaining plant safety. The emergency diesel generators at Units 1 – 7 underwent a routine manual startup test from July 25 to 27, and had their functional integrity confirmed.

>> Further details are being investigated.

(e) Release of radiation-contaminated water into the sea (associated with (a)) (Unit 6)

>> Puddles of water were found in non-radiologically controlled areas on the 3rd floor and mezzanine 3rd floor of the reactor building at Unit

6. Radiation measurement found that the water contained traces of radioactive materials.

- >> It was later found that this water was discharged into the sea via water discharge outlet. The amount of water discharged is estimated to be approx. 1.2 cubic meters with the radioactivity of  $9 \times 10^4$  becquerels. No significant fluctuations are observed in the readings of the seawater monitor, and the amount of radiation released was within the legal limit, indicating that there was no impact on the environment.
- >> The investigation showed that the water may have reached the non-radiologically controlled areas in the following route:
  - Earthquake-induced sloshing caused an overflow of water on the operation floor on the 4th floor of the reactor building (radiologically controlled area). The water then traveled into the power box of the fuel exchanger on the same floor, and dripped into a conduit tube from the gaps in the seal where the electrical cables in the box come through.
  - The conduit tube is laid under the floor, and leads to non-radiologically controlled areas of the reactor building. Some of the water that entered the tube dripped from the upper air-conditioning duct onto the mezzanine 3rd floor (between the 3rd and 4th floor) of the reactor building, and traveled from floor openings on the mezzanine 3rd floor to reach the 3rd floor.
  - The water that puddled on the 3rd floor drained into the floor scupper to be gathered in the non-radioactive wastewater tank on the first basement floor, before being pumped out into the sea.
- >> As an immediate measure to prevent further discharge into the external environment, the applicable tank's pump has been shut down. The sealing material for the power box of the fuel exchanger has also been replaced to prevent any gaps for higher air-tightness.

(f) Damage on the couplings of the drive axis for the overhead crane in the reactor building (Unit 6)

- >> Damage has been found on three of the four couplings. Detailed inspections on other areas will also be continued.
- >> The overhead crane has not become dislodged, and it has been confirmed that there is no risk of the crane falling off the ceiling. (See Attachment 2)

(g) Detection of iodine and radioactive particulate Matter by the monitor of the main exhaust stack (Unit 7)

- >> Regular measurement on the main exhaust stack at Unit 7 detected iodine and radioactive particulate matter. The amount of radioactive leak from the main exhaust stack was approximately  $4 \times 10^8$  becquerels. This puts the assessable radiation dose at approximately  $2 \times 10^{-7}$  millisieverts, which is below the annual exposure dose limit for the general public, stipulated by law (1 millisievert).
- >> The cause of the leakage is believed to be the delay in conducting a shutdown operation for the turbine's gland steam exhauster in the procedure following the automatic shutdown of the reactor. It is suspected that the iodine and radioactive particulate matter, which remained residual in the condenser, were drawn into the turbine's gland steam exhauster, and released into the atmosphere via the exhaust stack.

b. TEPCO defines the management status of non-conformities at power stations into six grades (As – Not applicable) and regularly releases the information. The status of non-conformities as of July 26 is as follows. There are over 1,200 earthquake-related non-conformities, and most of them are classified as minor events of Grade or below.

Grade	Description	No. of non-conformities related to the earthquake	Remarks
As	Reportable event as stipulated by law or Safety Regulations (events that have a serious impact on plant performance and safety)	10	<ul style="list-style-type: none"> <li>• Flooding of the operating floors</li> <li>• Fire of the station transformer at Unit 3, etc.</li> </ul>
A	Serious non-conformity against quality assurance requirements	33	<ul style="list-style-type: none"> <li>• Displacement of the duct connecting to the main exhaust stack</li> </ul>

	impact on outage schedule) etc.		protection system's piping, etc.
B	Non-conformity pointed out in a government inspection (events that require enhanced operation monitoring, etc.)	21	• Dislodgment of a blowout panel, etc.
C	Minor non-conformity against quality assurance requirements, etc.	491	
D	Event within the scope of normal maintenance, etc.	706	
N/A	Replacement of a consumable and equivalent event, etc.	2	
Total		1,263	

(Note) Examples of Grade C events include “leakage from the mechanical seal of a pump” and “damage to passageway windowpanes” (events concerning human safety), while examples of Grade D events include “valve seat pass that can be addressed with increased tightening”.

### 3. Initiatives and trends among relevant organizations

#### (1) Ministry of Economy, Trade and Industry (Nuclear and Industrial Safety Agency)

- a. From the perspective of ensuring public safety and security, the Ministry instructed electric utilities to implement the following measures on July 20:
  - (a) Enhance the in-house fire-fighting system
  - (b) Build a swift and strict accident reporting mechanism
  - (c) Confirm facilities' anti-quake safety with priority on public safety
- b. On July 23, Director-General Komoda of the Nuclear and Industrial Safety Agency visited Niigata Prefecture to explain the Agency's handling of the issue to the Governor of Niigata Prefecture, Mayor of Kashiwazaki City and the Mayor of Kariwa Village, and exchanged opinions with them.
- c. The Ministry has set up the Chuetsu Offshore Earthquake Investigation and Countermeasures Committee concerning Nuclear Power Facilities” to investigate facts regarding specific impact of the Chuetsu Offshore Earthquake on the power station, and identify future tasks and responses the government and electric utilities must address in reflection of the said Earthquake. On July 31, the Committee convened its first meeting, and agreed to set up Working Groups to examine specific issues listed below, and deliberate on their findings as the main Committee framework.
  - (a) The in-house fire-fighting corps, information liaison system and the mechanism for distributing information to local communities in the event of an earthquake
  - (b) Anti-quake safety assessment based on the knowledge obtained from the Chuetsu Offshore Earthquake
  - (c) The status of reactor operation management at the time of the Chuetsu Offshore Earthquake, integrity of plant facilities and future response
- d. Local safety inspectors are currently examining the plant status, reported by TEPCO, so as to identify the causes and detailed facts.

#### (2) Nuclear Safety Commission of Japan

- a. On July 19, at an ad-hoc meeting of the Nuclear Safety Commission, Chairman assured the safety of the Kashiwazaki Kariwa Nuclear Power Station in principle, based on the fact that the safety functions of greatest importance operated correctly. He also expressed his views on faults / problems reported in this earthquake, as well as future policies for addressing anti-quake safety.
- b. On July 30, the Commission adopted the “NSC views on, and future actions to take for, the impacts due to the Niigata-ken Chuetsu-oki Earthquake”. The main contents of the statement are as follows:

<Effectiveness of the New Seismic Guide>

The necessity of revising again the New Seismic Guide should be judged after the new Design Basis Earthquake Ground Motion be formulated in the back-check process and verified against the actual impacts due to the Earthquake. It is not the time to contend its necessity now.

<Confirmation of supporting capabilities of structures and systems>

The NSC requests that, in order to ensure conformance to the New Seismic Guide, TEPCO confirm support performance of and provide necessary reinforcement to the foundations for the structures classified as not only Seismic Class S but also Class B and C at all existing nuclear power stations as part of the back-check process.

<Strengthening of fire protection measures at earthquakes>

The NSC will investigate the status of compliance with the Fire Protection guide to explore enhancements to fire protection measures, taking into account the fact that the fire control systems did not function properly in the earthquake.

c. On August 7, Chairman Suzuki examined the latest status of investigation into the earthquake's impact on the Kashiwazaki Kariwa Nuclear Power Station, and visited the Niigata Prefectural Government, Kashiwazaki City Council and Kariwa Village Council to exchange opinions.

(3) Atomic Energy Commission

On August 7, the Atomic Energy Commission expressed its view on six key issues, including appropriate dissemination of information, in regard to initiatives already launched by the Nuclear Safety Commission and the Nuclear and Industrial Safety Agency.

(4) Local governments (Niigata Prefecture, Kashiwazaki City, Kariwa Village)

a. On July 18, Mayor Aida of Kashiwazaki City banned the use of the Kashiwazaki Kariwa Nuclear Power Station in accordance with the Fire Protection Law, citing fire prevention issues.

b. The local authorities of Niigata Prefecture, Kashiwazaki City and Kariwa Village conducted an "on-site inspection" according to Article 10 of the Safety Agreement in order to examine the extent of damage to the power station and confirm plant safety in the current status. The inspection was conducted on August 1 and 2, accompanied by the members of the Niigata Prefecture's engineering committee on the safety management of nuclear power stations, so as to utilize expert knowledge in investigating and checking the site.

(5) International Atomic Energy Agency (IAEA)

IAEA sent a fact-finding team to examine facts concerning radiation leakage and safety operation management, and lessons to be learned from the experience, with focus on areas of earthquake resistance. The team inspected the Kashiwazaki Kariwa Nuclear Power Station and interviewed concerned parties on August 6 – 9, and exchanged opinions with the Nuclear and Industrial Safety Agency on August 10.

The findings of the investigation are expected to be released swiftly.

#### 4. Initiatives by the Japan Nuclear Technology Institute

JANTI has compiled information on the status of the Kashiwazaki Kariwa Nuclear Power Station since the Chuetsu Offshore Earthquake, mainly based on information released by TEPCO, and provided accurate information in a timely fashion both domestically and internationally as listed below:

(1) Information delivery on the website (both in Japanese and English)

a. Status of the Kashiwazaki Kariwa Nuclear Power Station following the earthquake

- Report #1 (July 18) Details of the earthquake and its impact on the environment
- Report #2 (July 20) Information on seismic motions, remarks by the Chairman of the Nuclear Safety Commission
- Report #3 (July 23) News conference by METI Minister Amari, impact of the earthquake on nuclear fuel at the reactor core, etc.
- Report #4 (July 26) Report on the on-site investigation by JANTI
- Report #5 (August 1) Results of analysis on seismic observation data (initial report)

(Note) Reports #1 and #2 were first posted on JANTI's English website, as accurate information was not reported overseas at the time. Japanese versions have been posted from Report #3 onwards.

b. Status of the power station and main developments at TEPCO, national / local governments  
Posted on July 25 (and updated regularly since)

(2) On-site investigation

- July 23 – 24: On-site investigation (dispatching 3 officials to examine the extent of damage at the power station, Kashiwazaki City and Kariwa Village)
- The investigation findings were posted on the website as Report #4.

(3) Distribution of information to members

- July 27 Engineering Seminar (at Sendai: Providing information to approx. 40 members in the Tohoku region as part of the report on JANTI activities)
- July 27 On-site investigation briefing (approx 20 people from Chubu Electric Power Company)
- July 31 On-site investigation briefing (approx. 40 people from other electric utilities, electrical industry manufacturers, and Japan Atomic Industrial Forum)

(4) Media relations

- July 18 Yomiuri Newspaper: Interview article with JANTI President Ishikawa
- July 22 Hodo 2001: Featuring JANTI President Ishikawa
- July 26 NHK News Watch 9: Quoting comments by JANTI Executive Director
- July 267 Mezamashi TV: Quoting comments by JANTI Executive Director
- August 3 Regular meeting of the liaison council on the peaceful use of nuclear energy: JANTI President Ishikawa describing the status of the Kashiwazaki Kariwa Nuclear Power Station in his address to the council
- Other media engagements involving the JANTI President and other officials

(5) Briefing overseas organizations

On August 24, JANTI will visit the U.S. Nuclear Energy Institute to provide a briefing on the status of the Kashiwazaki Kariwa Nuclear Power Station. Coordination work is underway to arrange similar briefings for European organizations.

Information contained in this report will be updated as future detailed investigation by TEPCO makes new findings.

<References> [Tokyo Electric Power Company](#)  
[Nuclear and Industrial Safety Agency](#)  
[Nuclear Safety Commission of Japan](#)

Japan Nuclear Technology Institute  
Rev.0  
August 1, 2007