

PRI-07-61

Press Release Information	Nuclear and Industrial Safety Agency (NISA), Ministry of Economy, Trade and Industry (METI)
Consequences of "the Niigataken Chuetsu-oki Earthquake in 2007" at Kashiwazaki-Kariwa Nuclear Power Station, Tokyo Electric Power Company (the 19 <sup>th</sup> report)	

August 10, 2007

NISA/METI

On August 10, 2007, Nuclear and Industrial Safety Agency (NISA) received a follow-up of the incident and trouble report from Tokyo Electric Power Company and received information on the situation of Kashiwazaki-Kariwa Nuclear Power Station as shown below.

#### I. Report from Tokyo Electric Power Company

On August 10, Tokyo Electric Power Company submitted NISA the follow-up of the report pursuant to the provision of Article 62-3 of the Law on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Nuclear Reactors and the provision of Article 3 of the Rule for Incident Report on the Electric Facilities etc. set forth in the Electricity Utilities Industry Law (the original report was received on July 25). In the follow-up report, new facts were reported on the parameters indicating the status of the plant at the occurrence of the earthquake. (See Attachment 1)

Tokyo Electric Power Company reported that they confirmed that there had been no problem as to the functions of the equipment in the process from the reactor automatic shutdown to the cold shutdown, after having checked the important data indicating the status of Uni2, which had been under starting up operation, and Unit 3, 4 and 7, which had been under the normal operation.

#### II. Excerpts from the report submitted by Tokyo Electric Power Company

Tokyo Electric Power Company submitted the report on the plant status of Kashiwazaki-Kariwa NPP as shown on the Attachments 2 and 3.

NISA was informed of the event in which about 400 workers who had been in the controlled area of Units 1 and 2 at the occurrence of the earthquake, had gone out from the controlled area without passing through the exit monitoring system in order to prioritize their safety. It was confirmed that all of the dosimeters carried by those workers had been collected and

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checked . It was confirmed that no anomaly had been detected and that their working clothes with possible radioactive contamination had been taken off at the time of the evacuation and kept inside the controlled area.

The attachment 3 "Plant Inspection and Restoration Status" indicates the major tasks to be performed in the next two weeks. The inspection of the reactor will start from the middle of the week beginning on August 20 for Unit 1, whose upper lid of the reactor containment is open due to the periodic inspection, inspection of the reactor will start from around the.

### III. Present Information Release Criteria of Non-Conformity Found during Inspection and Restoration of the Plant after "the Niigataken Chuetsu-oki Earthquake in 2007"

Concerning the way of information release about non-conformity found after August 11, 2007, Tokyo Electric Power Company reported NISA that they will apply the disclosure criteria used prior to the occurrence of the earthquake. (Refer to Attachment 4)

### IV. Actions of NISA

1. As for the parameters reported on August 10, 2007 indicating the status of plant at the occurrence of the earthquake, detailed examination will be carried out to investigate whether the operational management had been adequate right after the earthquake by the Operations Management and Equipment Integrity Evaluation WG established within the "Subcommittee for Investigation and Response to the Nuclear Facilities affected by Chuetsu-oki Earthquake".
2. The NISA Nuclear Power Safety Inspectors confirm the plant status reported by Tokyo Electric Power Company, including details of the facts and causes of the incidents.
3. At present, no significant reading of fluctuation is identified by either the radiation monitoring systems of the main stacks nor the monitoring posts.
4. From August 11, 2007, NISA will release the information once a week in line with the report submission from Tokyo Electric Power Company. However, information on eventual events will be reported as it occurs.

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Attachment 1

GenkanHatsukan-19 No.269

August 10, 2007

Mr. Akira Amari  
Minister of Economy, Trade and Industry

Tsunehisa Katsumata  
President  
Tokyo Electric Power Company  
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Kashiwazaki-Kariwa Nuclear Power Station

Submission of the report pursuant to the provision of Article 19-17 of the Rule for the Installation and the Operation of Commercial Nuclear Power Reactors due to "the Niigataken Chuetsu-oki Earthquake in 2007" as well as the provision of Article 3 of the Rule for Incident Report on the Electric Facilities.

Following the report made in GenkanHatsukan-19 No.224 (dated July 25, 2007) pursuant to the provision of Article 19-17 of the Rule for the Installation and the Operation of Commercial Nuclear Power Reactors as well as the provision of Article 3 of the Rule for Incident Report on the Electric Facilities, please find the follow-up of the investigation status in the attachment.

The causes and measures will be reported later as they are clarified and devised.

Attached documents

Kashiwazaki-Kariwa Nuclear Power Station

Report pursuant to the provision of Article 19-17 of the Rule for the Installation and the Operation of Commercial Nuclear Power Reactors due to "the Niigataken Chuetsu-oki Earthquake in 2007" as well as the provision of Article 3 of the Rule for Incident Report on the Electric Facilities.

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Failure Report on the Nuclear Reactor Facility and  
Incident Report on the Electric Facilities

August 10, 2007

Tokyo Electric Power Company

<p>1. Subject: Kashiwazaki-Kariwa Nuclear Power Station</p> <p style="text-align: center;">Report pursuant to the provision of Article 19-17 of the Rule for the Installation and the Operation of Commercial Nuclear Power Reactors due to "the Niigataken Chuetsu-oki Earthquake in 2007" as well as the provision of Article 3 of the Rule for Incident Report on the Electric Facilities.</p>
<p>2. Reporting company</p> <p>1) Name of company (Company which installed the electric structure): Tokyo Electric Power Company</p> <p>2) Address: 1-3-1 Uchisaiwaicho, Chiyoda-ku, Tokyo</p>
<p>3. The time of occurrence: July 16, 2007 10:13am (When the earthquake occurred)</p>
<p>4. Electric structure (installation place and operational voltage) of incident: (pursuant to the provision of Article 3-1-3 of the Rule for Incident Report on the Electric Facilities)</p> <p>Kashiwazaki-Kariwa Nuclear Power Station Unit 3 (output 1100MWe) house transformer (B) (operational voltage 19kV)</p> <p>Manufacturer: Toshiba, Inc.</p> <p>Year of manufacture: 1992</p>
<p>5. Status:</p> <p>Due to "the Niigataken Chuetsu-oki Earthquake 2007" occurred at 10:13am, July 16, 2007, the nuclear reactors have automatically shut down; Unit 2 was under the starting up operation and Units 3,4, and 7 under the normal operation. As a result of walkdown after the earthquake, it was confirmed that there are some events involving radioactive materials such as leakage of water containing radioactive materials in the reactor building of Unit 6 (uncontrolled area), and at the refueling floor of the reactor building of Unit 1 to Unit 7 (controlled area), and other non-conformities to the requirements.</p> <p style="text-align: center;">Major events confirmed at present are shown below;</p> <p>5.1 Major non-conformities to the requirements confirmed by the walkdown after the earthquake.</p> <p>1) Leakage of water containing radioactive materials to uncontrolled area of the reactor building of Unit 6.</p> <p>Around 12:50pm, July 16, 2007, a water paddle was identified in the uncontrolled</p>

areas of the third floor and the medium third floor in the Unit 6 reactor building. Sample was collected for the radioactive measurement, and on 06:20pm, it was confirmed that leaked water contained radioactive materials. The amount of leakage was about 0.6 liters for the third floor and about 0.9 liters for the medium third floor, and the activity was about  $2.8 \times 10^2$ Bq and about  $1.6 \times 10^4$ Bq respectively.

At 08:10pm, it was confirmed that the leaked water was discharged to the sea water the discharge outlet. The amount of discharged water was about  $1.2\text{m}^3$  and the activity was estimated to be about  $9 \times 10^4$  Bq. There was no impact to the environment, as the reading of the sea water monitor did not show any significant fluctuation and the amount of discharged activity was below the value set by law.

As the result of the investigation, the path through which the leakage reached the uncontrolled area was estimated as below;

- In the operating floor of the 4<sup>th</sup> floor of the reactor building (controlled area), the water containing radioactive materials sloshed out of the spent fuel pool onto the refueling floor due to the earthquake
- The water on the floor flowed into the electricity supply box of fuel handling machine installed in the refueling floor and then flowed into inside of the electric cable conduit through gap of the seal of cable penetration inside the box
- Since the electric cable conduit was laid under the floor of the building and was connected to the uncontrolled area of the reactor building, a part of the water flowed into the electric cable conduit dripped from the area around the ventilation system duct of the medium 3<sup>rd</sup> floor (the floor between the 3<sup>rd</sup> and 4<sup>th</sup> floors) of the reactor building and also dripped onto the 3<sup>rd</sup> floor through the opening of the medium 3<sup>rd</sup> floor.
- The water accumulated on the 3<sup>rd</sup> floor flowed through the drain in the floor into the tank, which is installed at the 1<sup>st</sup> basement floor to collect non-radioactive drained water, and finally was discharged into the sea from the discharge outlet.

As temporary measure to prevent discharge to the environment outside the power station, the pump of the concerned tank has been stopped. At the refueling floor of the 4<sup>th</sup> floor in the reactor building (controlled area), sealing material of the fuel handling machine power supply box has been exchanged and to improve the sealing of the opening.

(As the water containing radioactive materials leaked into the uncontrolled area, the event was judged as reporting event pursuant to the provision of Article 19-17 of the

Rule for the Installment and the Operation of Commercial Nuclear Power Reactors)

2) Overflow of water at the refueling floor of the reactor building of Unit 1 through 7

As a result of the walkdown after the occurrence of “the Niigataken Chuetsu-oki Earthquake 2007,” it was confirmed that, in addition to the leakage of water containing the radioactive materials, there was an overflow of water containing the radioactive materials from the spent fuel pool all over the refueling floor of the reactor buildings of Unit 1 through 7 by sloshing due to the earthquake.

Because the overflowed water remained inside the refueling floor (controlled area) and it was thought that there was no risk for the expansion of the leakage, the worker of Tokyo Electric Power Company continued the walkdown of equipment.

The result of analyses of the leaked water showed that leakage in all the unit contained radioactivity. The results of radioactivity concentration analyses (maximum value) for each unit are as shown below:

- Unit 1: about  $4.1 \times 10^0$ Bq/cc (Analyzed on July 19)
- Unit 2: about  $6.7 \times 10^1$ Bq /cc (Analyzed on July 19)
- Unit 3: about  $7.8 \times 10^1$ Bq /cc (Analyzed on July 19)
- Unit 4: about  $2.6 \times 10^1$ Bq /cc (Analyzed on July 19)
- Unit 5: about  $1.9 \times 10^1$ Bq /cc (Analyzed on July 19)
- Unit 6: about  $1.4 \times 10^1$ Bq cc (Analyzed on July 16)
- Unit 7: about  $2.7 \times 10^1$ Bq /cc (Analyzed on July 20)

(It was estimated that the extent of the leakage was not minor because the cause was similar to the leakage of water containing radioactive materials to the uncontrolled area of the reactor building of Unit 6, and overflow extended in all over the operating floor. The event was judged as reporting event pursuant to the provision of Article 19-17 of the Rule for the Installation and the Operation of Commercial Nuclear Power Reactors)

3) Damage of drive axis universal joint of overhead crane in the Unit 6 reactor building

On July 24, 2007, during the inspection of equipment after the occurrence of “the Niigataken Chuetsu-oki Earthquake 2007”, it has been confirmed that the drive axis of the overhead crane in the Unit 6 reactor building was broken.

As the overhead crane was not derailed, it has been confirmed that there is no risk of falling from the ceiling.

(As this is a damage of the equipment important to safety which is not conform to the technical standard, the event was judged as a reportable event pursuant to the provision of Article 19-17 of the Rule for the Installment and the Operation of

Commercial Nuclear Power Reactors)

4) House transformer (B) in Unit 3 caught on fire

At 10:13am, July 16, 2007, "the Niigataken Chuetsu-oki Earthquake 2007" occurred, and at 10:15am, operating worker has found smoke generated from the house transformer (B) of Unit 3. Fire extinguished at 12:10PM on the same day. The investigation, mainly visual inspection, was carried out and followings were confirmed:

- Connection bus of the transformer and the secondary side of the transformer was vertically displaced.
- Oil leakage from bushing of the secondary side of the concerned transformer
- Traces of fire was observed on the connection duct of connection bus of the secondary side of the transformer. The visual inspection carried out from the hole on bus part confirmed that a part of bus was melted and broken.

(Although an investigation in detail is still continued, considering the significance of the event, it was judged as a reportable event pursuant to the provision of Article 3 of the Rule for Incident Report on the Electric Facilities.)

5) Other Non-conforming Events

In addition to the above events, the walkdown after the occurrence of "the Niigataken Chuetsu-oki Earthquake 2007" confirmed no-conformities to the requirements shown as below.

(1) Flooding in the 5<sup>th</sup> basement floor of the reactor combination building of Unit 1

On July 16, 2007, it was confirmed that a 40cm-deep water pool was formed in the 5<sup>th</sup> basement floor (the lowest floor) of the reactor combination building Unit 1 (controlled area). The cause is estimated as inflow from the fire protection system piping which were damaged by the earthquake. The amount of leakage was about 1,670m<sup>3</sup> and radioactive materials were not detected from the collected sample.

As the investigation was continued, on July 19, radioactive materials were detected (radioactivity concentration was evaluated as about 6Bq/cc) from the sample collected from the different place as the sampling on July16. Relation with the flooding is currently under investigation. From the re-measurement conducted on July 23, it was confirmed that the depth of water was about 48 cm and the amount of leakage was estimated to be about 2,000m<sup>3</sup>.

(2) Displacement of the duct connected to the main exhaust stack in Units 1 to 5

On July 16, 2007, displacement of the duct connected to the main exhaust stack of Units 1 to 5 was confirmed.

No significant fluctuation has been identified at the monitoring posts before and after the occurrence of the earthquake, and the impact of radioactivity to the outside is not confirmed.

(3) Detection of radioactive materials from the main exhaust stack of Unit 7

On July 17, 2007, iodine and particulate radioactive materials (Cr-51, Co-60) was detected during a weekly periodic measurement of the main exhaust stack of Unit 7. On July 18, iodine was again detected at the measurement.

Based on the detected radioactive materials, it was confirmed that the estimated total amount of detected iodine activity was about  $4 \times 10^8$  Bq and the resultant dose is about  $2 \times 10^{-7}$  mSv, which is below the annual exposure dose limit for the general public stipulated by the law (1 mSv).

It is estimated that, as the turbine gland steam ventilator had been in operation during the operation process after the reactor automatic shutdown, iodine and particulate radioactive materials, which had been accumulated in the main condenser, were sucked in by the turbine gland steam ventilator. These particulates were released into the environment via the plant main exhaust stack.

The ventilator was stopped on July 18. As the results of sampling analysis of reactor water, it was confirmed that there was no leakage of radioactive materials from the fuel rods to the reactor water.

(4) Departure from the limited condition for operation (LCO)

a) Departure from the LCO due to low water level of spent fuel pool of Units 1, 2 and 3.

On July 16, 2007, the departure from the LCO was declared as low water level was confirmed in the spent fuel pool of Units 1 to 3. Later, the return to the normal level was declared as the water level was restored.

Date and time of the declaration of the departure from the LCO and the subsequent return within the LCO were as follows;

• Declaration of the departure of the LCO

Unit 1: July 16, 3:47pm

Unit 2: July 16, 3:45pm



Unit 3: July 16, 3:45pm

- Declaration of the subsequent return within the LCO

Unit 1: July 16, 4:15pm

Unit 2: July 16, 4:15pm

Unit 3: July 16, 3:45pm

b) Departure from the LCO due to the displacement of the Unit 3 turbine building blowout panel

At 3:37 pm, on July 16, 2007, departure from the LCO was declared because the turbine building blowout panel was displaced, which was judged as possible loss of the ability to maintain the negative pressure in the reactor building.

At 23:07, as the reactor became under the cold shutdown status (reactor water temperature is lower than 100 degree Celsius), it was not required any more to maintain the negative pressure in the reactor building. Therefore, the subsequent return within the LCO was declared.

As for this blowout panel, it was tentatively restored on July 21. As the turbine building blowout panels of Units 2 and 3 also were displaced, they were tentatively restored on July 20.

(5) Displacement of the service platform in the spent fuel pool

On July 16, 2007, it was confirmed that a service platform installed in the spent fuel pool of Units 4 and 7 fell on the spent fuel storage rack. It was also confirmed that a service platform of Unit 6 was displaced from the fixed position and fixed on a wire.

At Unit 4 and 7, where service platforms fell on the spent fuel storage rake, the water sampling analysis was conducted on the water from the spent fuel pool, but the radioactive iodine concentration was below the detection limit. Therefore, it is estimated that the spent fuels are not damaged.

(6) Tipping over of drums in the solid waste storage warehouse

On July 17, 2007, it was confirmed that about one hundred drums in the No.2 wing of the solid waste storage warehouse tipped over and several drums were found with their lids open.

The incident is still under investigation, but so far, it is confirmed that 438 drums in the solid waste storage warehouse tipped over and 41 drums were found with their lids open, and 41 drums were inclined.

Radioactive material concentration in the air in the solid radioactive waste storage warehouse was measured at 4 locations, and no radioactive material was detected. It was confirmed that water leaks from the drums tipped over and the amount of leaked water is about 16 liters, but no radioactivity was detected. The water leaked from the drums were wiped on July 18.

#### 5.2 Confirmation of plant status at the occurrence of the earthquake

At the occurrence of the earthquake, Unit 2 had been under the start up operation and Units 3, 4 and 7 had been under normal operation. All of these reactors were automatically shut down due to the actuation of the reactor protection systems by the scram signal "high seismic acceleration." Between July 16 and 17, all these reactors reached the cold shutdown status (reactor water temperature below 100 degree Celsius) and have since been in the stable status.

For all the units, the major parameters showing the safety condition were checked for the process from the reactor automatic shutdown to the cold shutdown status to confirm that there was no problem with the operation of the equipment.

As the whole station is currently under inspection, the new findings will be reported as they are identified.

#### 6. Causes

The cause of the incidents is estimated "the Niigataken Chuetsu-oki Earthquake in 2007" occurred at 10:13 am, on July 16, 2007. Magnitude of the earthquake is 6.8 and its epicenter is at about 17 kilometers of depth. (Numerical values are provisional)

#### 7. The Extent of the Damage

- 1) Killed or injured persons: None
- 2) Fire: Occurred (at the Unit 3 house transformer (B)/ partly burn out)
- 3) Fail to power supply: None
- 4) Others (other damages excluding above): None

8. Date of full restoration: Not yet determined.

9. Countermeasures: Based on the investigation results, necessary measures will be taken.

**10. Name and affiliation of the Chief Engineer of Reactors**

**Class 1 Chief Engineer of Reactors (Selected)**

**11. Confirmation by the Establisher of the Electrical Structures: Done**

Attachment 2

Plant Status of Kashiwazaki-Kariwa Nuclear Power Station after the Niigataken Chuetsu-oki Earthquake in 2007 (as of August 10, 2007)

Plant Status : All unit were shutdown after the occurrence of the earthquake.

1. Visual Inspection Results After the Earthquake: A total of 65 incidents have been confirmed to date (excluding 4 incidents of reactor automatic scram due to the earthquake).

(1) Incidents related to radioactive materials (15 cases)

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
Unit 1	Shutdown (in an outage)	Displacement of the duct connected to the main exhaust stack. Detailed investigation underway.	Investigation on the size of the displacement and whether there had been a leakage of radioactivity is being conducted. <u>(Already announced on July 17).</u>
		Damage to fire protection system pipings leading to a 40cm-deep puddle of water on the B5 floor (the lowest floor, controlled area) of the Reactor Combination Building.	Amount of leakage: about 1,670m <sup>3</sup> . Confirmed re-leakage with radioactivity. (Already announced on July 19). After repairing the fire protection system piping, depth of water is 48 cm. Maximum amount of leakage: about 2,000m <sup>3</sup> . <u>(Already announced on July 23).</u>
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 27. <u>(Already announced on July 27).</u>
Unit 2	Starting up	Displacement of the duct connected to the main exhaust stack. Detailed investigation underway.	Investigation on the size of the displacement and whether there had been a leakage of radioactivity is being conducted. <u>(Already announced on July 17).</u>
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 24. <u>(Already announced on July 25).</u>
Unit 3	Operating	Displacement of the duct connected to the main exhaust stack. Detailed investigation underway.	Investigation on the size of the displacement and whether there had been a leakage of radioactivity is being conducted. <u>(Already announced on July 17).</u>

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 20. (Already announced on July 23).
Unit 4	Operating	Displacement of the duct connected to the main exhaust stack. Detailed investigation underway.	Investigation on the size of the displacement and whether there had been a leakage of radioactivity is being conducted. (Already announced on July 17).
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 23. (Already announced on July 24).
Unit 5	Shutdown (in an outage)	Displacement of the duct connected to the main exhaust stack. Detailed investigation underway.	Size of the displacement: about 4cm. Investigation whether there had been a leakage of radioactivity. (Already announced on July 17).
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 24. (Already announced on July 25).
Unit 6	Shutdown (in an outage)	Minuscule amount of radioactivity found on the 3rd floor of the reactor building (0.6 liter; $2.8 \times 10^2$ Bq) and mezzanine 3rd floor of the reactor building which is an uncontrolled area (0.9 liter; $1.6 \times 10^4$ Bq). Leaked water discharged to the sea via water discharge outlet (Total amount of discharged water: $1.2\text{m}^3$ ; radioactivity: $9.0 \times 10^4$ Bq; no change observed on the seawater radioactivity monitor.) No water is discharged at this moment.	Radionuclides discharged to the sea is as follows: Co-58 ( $7.7 \times 10^3$ Bq) Co-60 ( $4.3 \times 10^4$ Bq) Sb-124 ( $3.5 \times 10^4$ Bq). (Already announced on July 20).
		Water puddle on the reactor building refueling floor.	Already announced on July 17. Completed soaking up water from the floor on July 23. (Already announced on July 24).
Unit 7	Operating	Detected Iodine and particulate materials (Cr-51 and Co-60) during a weekly periodic measurement of the main exhaust stack. Detected radioactivity: $3 \times 10^8$ Bq.	Already announced on July 17. The measurements made on July 18 detected the release of I-131 and I-133. However, for the period of July 19 to July 23, no radioactive material has been detected. (Already announced on July 24).

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
		Water puddle on the reactor building refueling floor.	Detected radioactivity on July 20. Completed soaking up water from the floor on July 21. (Already announced on July 23).

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

(2) Incidents not related to radioactive materials (54 cases)

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
Unit 1	Shutdown (in an outage)	Departure from Limiting Condition of Operation (LCO) due to low water level of spent fuel pool and subsequent return to normal level.	Already announced on July 16.
		Small amount of oil leakage (still continuing) from the exciter power transformer; displacement from foundation base.	Unknown amount of oil leakage. Small amount of leakage continues. (Already announced on July 17). Confirmed that oil leakage ceased on July 27. (Already announced on July 30).
		Double door of the reactor building kept open due to power loss.	No departure from LCO since the unit is in cold shutdown condition. (Already announced on July 17). Closed the double door after the power had been restored on July 24. (returned to normal condition) (Already announced on July 24).
		A puddle of water extending from the electrical instrument room of the emergency diesel generator (A) controlled room boundary door to non-controlled area.	Amount of leakage: about 4 liters. Leakage ceased. No radioactivity. (Already announced on July 17).
		Power loss of liquid waste treatment system control room control panel.	No impact on plant monitoring. (Already announced on July 17).
		<u>Displacement at the connection between house transformers 1A and 1B and isolated phase bus. Breakage of foundation bolt.</u>	Investigating the size of the displacement. (Already announced on July 17).
		Subsidence, slant, crack and abruption of concrete, opening of the joint on the oil protection bank of transformer.	Opening of the joint: 10 locations, maximum width 7cm. (Already announced on July 19).
		C shoes (red shoes) found on top of the bulk head inside the reactor well at the Unit 1 reactor building refueling floor.	C shoes placed near the reactor well opening fell into the reactor well at the time of the earthquake. Planned to be picked up. (Upgraded non-conformance grade from C to B on August 3).
Unit 2	Starting up	Reactor automatic scram due to earthquake.	Already announced on July 16.
		Departure from LCO due to low water level of spent fuel pool and subsequent return to normal level.	Already announced on July 16.

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
		Oil leakage from between the main transformer and its cooler main piping (still continuing). Breakage of foundation bolt.	Unknown amount of leakage. Considering oil removal. (Already announced on July 17). Leakage stopped by covering with filler. (Already announced on July 25).
		Lateral displacement of exciter power transformer foundation and duct for power bus.	Investigating the size of the displacement. (Already announced on July 17).
		Water intake screen washing pump unable to start.	Already announced on July 17. Restoration of 2 pumps on July 27. (Already announced on July 30).
		Displacement of the turbine building blowout panel.	No leakage radioactivity. (Already announced on July 17). Temporarily restored on July 20. (Already announced on July 21).
		Oil leakage in the oil tank room of the turbine driven reactor feedwater pump (B).	Amount of oil leakage: about 800 liters. Leakage ceased. (Already announced on July 17). Completed oil recovery on July 19. (Already announced on July 19).
		Subsidence, lateral displacement of the oil protection bank of transformer.	Lateral displacement : one location, 2cm wide. (Already announced on July 19).
Unit 3	Operating	<u>Reactor automatic scram due to earthquake.</u>	Already announced on July 16.
		<u>LCO due to low water level of spent fuel pool and subsequent return to normal level.</u>	Already announced on July 16.
		Departure from LCO due to displacement of the reactor building blowout panel and subsequent return to within the LCO due to cold shutdown of the unit.	Already announced on July 16. (Returned within the LCO since the unit came to a cold shutdown condition). Temporarily replaced the blowout panel on July 21. (Already announced on July 21).
		Displacement of the turbine building blowout panel.	Already announced on July 18. Temporarily replaced on July 20. (Already announced on July 21).
		House transformer 3B caught on fire.	On July 16 at 10:15AM, house transformer 3B was found on fire. Fire extinguished at 12:10PM on the same day. (Already announced on July 16).

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.



Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
		Oil leakage from oil exhaust piping of K-3/4 low voltage start-up transformer (3SB).	Unknown amount of oil leakage. Leakage continuing. Low voltage start-up transformer shutdown due to continuing oil leakage. (Already announced on July 17). Confirmed that oil leakage ceased on July 23. (Already announced on July 23).
		Displacement in exciter power transformer foundation and power bus duct.	Investigating the size of the displacement. (Already announced on July 19).
Unit 4	Operating	Reactor automatic scram due to earthquake.	Already announced on July 16.
		Leakage of seawater from crack occurred in rubber flexible joint between condenser B seawater box and connecting valve.	Size of the crack: 3.5m. Amount of leakage: 24m <sup>3</sup> . (Already announced on July 17). Leakage ceased on July 19. (Already announced on July 19).
		Service platform in the spent fuel pool fell on the spent fuel storage rack with spent fuels. No damage to the fuels.	Spent fuel pool water analyses confirmed there is no damage to fuels.
		Subsidence and tilt of the oil protection bank of transformer.	Opening of the joint: one location, maximum width 20cm. (Already announced on July 19).
Unit 5	Shutdown (in an outage)	Leakage from No.4 filtered water tank.	Amount of oil leakage: about 900m <sup>3</sup> . Leakage ceased. No radioactivity. (Already announced on July 17).
		Water intake screen washing pump unable to start.	Already announced on July 17.
Unit 6	Shutdown (in an outage)	Oil leakage from low voltage start-up transformer (6SB).	Low voltage start-up transformer shutdown due to small amount of continuing oil leakage. (Already announced on July 17). Confirmed that oil leakage ceased on July 23. (Already announced on July 23).
		Dislocation of the service platform in the spent fuel pool.	Spent fuel rack is underneath the dislocated service platform; however the platform is fixed on a wire. Considering how to handle the situation. (Already announced on July 19). Stabilization measures, such as fixing the wire to a handrail, have been taken on July 25. (Already announced on July 26).

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
Unit 7	Operating	Reactor automatic scram due to earthquake.	Already announced on July 16.
		Degradation of water tightness of the water-tight doors of the Reactor Core Isolation Cooling System and Residual Heat Removal System (A) and (C).	Already announced on July 17.
		Subsidence, slant, opening of the joint on the oil protection bank of transformer.	Opening of the joint: 2 locations, maximum width 4cm. (Already announced on July 19).
		Service platform in the spent fuel pool fell on the spent fuel storage rack with spent fuels. No damage to the fuels.	Spent fuel pool water analyses confirmed there is no damage to fuels. (Already announced on July 19).
		Confirmed dropping of light fixture, dropping of ceiling decorative sheet, crack, displacement of emergency lighting, and opening of inspection door in the Units 6, 7 main control room.	(Upgraded non-conformance grade from C to B on August 3). (Already announced on August 3).
Switch yard	—	500kV New Niigata 2L shut down.	Already announced on July 16. Resumed operation on July 29. (Already announced on July 30).
		Slight gas leakage from breaker of 500kV New Niigata 2L.	Temporarily repaired with rubber bands. (Already announced on July 17). Completed restoration on July 28. (Already announced on July 30).
		Oil leakage from 500kV South Niigata 2L black phase bushing. (South Niigata 2L shut down.)	Unknown amount of oil leakage. Considering oil removal. (Already announced on July 17). Partially removed oil and confirmed oil leakage ceased on July 28. (Already announced on July 30).
		Slippage of soil from the east-side slope.	Cracks with width of about 10cm. (Already announced on July 19).

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Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
Solid Waste Storage Warehouse	—	Several hundred of drums in the solid waste storage warehouse tipped over and several tens of drums were found with their lids open.	No radioactive material detected from measurement of airborne radioactive material concentration in 4 locations of the solid waste storage warehouse. Confirmed water leakage from tipped over drums. Amount of leakage: 16 liters. No radioactivity. Soaked up leakage from floor. (Already announced on July 18). Although no impact on external environment has occurred, all intake and exhaust opening of the warehouse were sealed on July 20. (Already announced on July 21).
Administration Office Building	—	Normal power supply to the main office building were shut down. Power is supplied from emergency power source for the emergency response room, etc.	Power supply to the emergency response room has been restored to normal power. (Already announced on July 17). Normal power supply to the administration office building is under the restoration. (Already announced on August 3).
		No damage occurred to the building structure (columns and beams) of the office and information buildings. An expansion joint was damaged; many cracks occurred; many glass panes broke; the rooftop air conditioning unit was damaged; the waterproof tank was damaged; ducts fell; cooking equipment fell.	Already announced on July 17.
Site and others	—	Partial damage to the diagonal steel frame of the lightning arrester tower.	No damages found on main frame. (Already announced on July 18).
		Penetration of the joint in the bank of heavy oil tank.	Already announced on July 18. Restored on July 20. (Already announced on August 3).
		Part (north slope) of the soil disposal area collapsed.	Already announced on July 17. Under the restoration. (Already announced on August 3).
		Water leaked from the drinking water tank.	Already announced on July 17. Restored on August 2. (Already announced on August 3).

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Unit	Status Prior to Earthquake	Status at the Time of Earthquake	Current Status
		<p>Fire protection system: the pipe was damaged at five locations, resulting in water leaks.</p> <ul style="list-style-type: none"> <li>KK-1: Northeast side of the reactor building</li> <li>KK-1: West side of the turbine building</li> <li>KK-1: Near the fire hydrant adjacent to the diesel oil tank</li> <li>KK-2: Feed line to the service building</li> <li>KK-2: Feed line to the heat exchanger building</li> </ul>	<p>KK-1: Northeast side of the reactor building: Restored on July 18. (Already announced on July 19).</p> <p>KK-1: West side of the turbine building: Restored on July 20. (Already announced on July 21).</p> <p>KK-1: Near the fire hydrant adjacent to the diesel oil tank: Restored on July 19. (Already announced on July 19).</p> <p>KK-2: Feed line to the service building: Restored on July 17. (Already announced on July 19).</p> <p>KK-2: Feed line to the heat exchanger building: Restored on July 20. (Already announced on July 21).</p>
		<p>The environmental minicomputer (Unit 1 service building) and telemeter transmission to the prefecture became disabled.</p>	<p>Restored telemeter transmission to the prefecture on July 17 at 15:40. (Already announced on July 17).</p> <p>Restored all system on July 18 at 18:00. (Already announced on July 19).</p>
		<p>The station road was cut off. Soil liquefaction occurred in a wide area of the site.</p>	<p>Currently travelable. (Already announced on July 17).</p>
		<p>A 50 cm difference in road level occurred in the approach road, making it impassable. Repair work begun.</p>	<p>Currently travelable. (Already announced on July 17).</p>
		<p>Bank protection of the north-south discharge outlet sunk.</p>	<p>Already announced on July 17.</p>
		<p>Water intake bank protection joint crack.</p>	<p>Size of crack: maximum about 8cm. (Already announced on July 17).</p> <p>Maintenance work completed on August 2. (Already announced on August 2).</p>
		<p>Onsite control panel of heavy oil tank fire protection system damaged.</p>	<p>Restored on July 19. (Already announced on July 17).</p>

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

(Unit 3) Water inflow found from the wall in the B1 floor of the turbine building. This water is presumed to have pooled in the pit adjacent to the turbine building and subsequently flowed into the turbine building via the penetration of electrical cable conduits, etc. No radioactivity has been detected. Collected water that flowed in on July 26. Confirmed no more inflow into the turbine building on July 27.

(Solid Waste Storage Warehouse) A water puddle suspected to have occurred from ground water due to rainfall was found near the boundary of the 1<sup>st</sup> building in the B1 floor of the solid waste storage warehouse and the administrative building. No radioactivity was detected. Completed soaking up water from the floor on July 26. Confirmed no more inflow on July 27.

(Support Building) A water puddle suspected to have occurred from ground water due to rainfall was found in the B1 floor of the support building. No radioactivity was detected. Confirmed no more inflow on July 27. Completed soaking up water from the floor on July 27.

• The following oil leakage incidents were identified inside the power station:

- Small amount of oil film found at the Unit 1 turbine building sub-drain and at the discharge outlet of Units 1 to 4. Discharge from the sub-drain has been ceased and preparation is underway to process the drainage in a temporary tank. Oil film at the discharge outlet will continued to be monitored as the sub-drain drainage has been ceased.

On July 31, a temporary oil separation tank was installed and two-fold oil protection fences with absorption mats were installed at the discharge outlet. Incidentally, oil protection fences were installed at discharge outlet yards of Arahama-side (for Units 1 through 4) and Ohminato-side (for Units 5 through 7).

- Crack found at the base of oil protection banks of Units 1 to 3 transformers. Insulating oil is suspected to have infiltrated into the soil. Maximum estimated amount of insulating oil leakage: about 200 kl including those from transformers of other units that are yet to be examined thoroughly. Recovery of soil under and surrounding the oil protection banks is considered.

- At the Unit 6 reactor building 4F refueling floor, a leakage of about 24 liter of hydraulic oil was found from the stud bolt tensioner (Note-1). Leakage ceased. Oil recovery and clean-up completed on August 7.

- At the Unit 4 reactor building 3F refueling floor, a leakage of about 200 liter of hydraulic oil was found from the stud bolt tensioner (Note-1). Leakage ceased. Oil recovery and clean-up completed on August 8.

(Note-1): Hydraulic equipment used to constrict bolts that fix the upper head of the reactor pressure vessel.

• A water puddle was found on August 1<sup>st</sup> in the cable trench between the Unit 6 reactor building B1F (uncontrolled area) and the control building B2F (uncontrolled area).

A mount of water: about 3m<sup>3</sup>. No radioactivity.

2. Incidents found after start of detailed inspection.

Incidents Found after Start of Detailed Inspection	Current Status
Breakage found on the coupling of the drive axis of the reactor building overhead crane. (Unit 6)	Breakage found on two coupling of the drive axis of the Unit 6 reactor building ceiling crane. (Already announced on July 24). An additional breakage was found based on external visual inspection for the relevant two breakage parts. Detail inspection underway for other parts as well. (Already announced on August 3).

**Reference**

- Total number of injured person at the Kashiwazaki-Kariwa site at the occurrence of earthquake: 9 (no radiation exposure).
  - Total number of injured person at the Kashiwazaki-Kariwa site after the occurrence of earthquake: 3 (no radiation exposure).
  - Number of workers in the controlled area at the occurrence of the earthquake: 817. (Unit 1: 418, Unit 2: 6, Unit 3:26, Unit 4: 1, Unit 5: 94, Unit 6: 270, Unit 7: 2)
- Sixty-five workers were in the reactor building refueling floor inspecting the ceiling crane, preparing for the control rod inspection, decontaminating equipments, etc. Spent fuel pool water splashed on several workers but all of them exited the controlled area after confirming they were not contaminated by radioactive material.
- At Units 1 and 2, TEPCO ordered workers (about 400) to exit the controlled area without using the exit monitoring system after confirming that no one work wears for contaminated areas (C-clothes). This action was taken from a human safety point of view because all but one exit monitoring system malfunctioned. This is a legitimate action prescribed in the emergency procedure.

**Other information:**

- Reactor water analyses for Units 2 through 7, which have fuels in the reactor core, confirmed there was no damage to fuels in the reactor core.
- Periodic measurements for radioactivity from the main exhaust stacks for Units 1, 2, and 6 confirmed there was no radioactivity (during the period from July 17 through August 6).
- Periodic measurements for radioactivity from the main exhaust stacks for Units 3, 4, 5 and 7 confirmed that there was no radioactivity (during the period from July 17 through August 7 for Units 3, 4 and 5, and from July 23 through August 7 for Unit 7).
- Periodic manual start-up surveillance testing of emergency diesel generators for each unit (totaling 20 diesel generators excluding one for Unit 1 that has been under inspection since before the earthquake) were conducted and all were confirmed to be functional.
- The following incidents, all of which are presumed to be effects of rainfall, were found in the controlled area:
  - (Unit 1) A water puddle was found in the Low Pressure Condensate Pump Room at the B2 floor of the turbine building. Rainfall is suspected to have flowed in from the connection passage between the turbine building and the support building and subsequently flowed into the B2 floor via B1 floor of the turbine building. No radioactivity has been detected. Completed transferring the water from the puddle to the waste processing system on July 26. Confirmed no more inflow into the B1 floor of the turbine building on July 27. Small amount of water continues to dribble into the connection passage between the turbine building and the support building. Recovery of water in the connecting passage underway on July 30.

Bold type characters: newly registered incident. Underlined part: incident already announced or corrected part.

Plant Inspection and Restoration Status of Kashiwazaki-Kariwa Nuclear Power Station after the Niigataken Chuetsu-oki Earthquake in 2007

[Inspection and restoration status]

◇Schedule: August 11(Sat), 2007- August 24(Fri), 2007

	Inspection and restoration items	11(Sat)	12(Sun)	13(Mon)	14(Tue)	15(Wed)	16(Thu)	17(Fri)	18(Sat)	19(Sun)	20(Mon)	21(Tue)	22(Wed)	23(Thu)	24(Fri)	Inspection and restoration status
Preparation for opening of the reactor pressure vessel	Inspection of the overhead cranes of Units 1 through 7	■	■				■	■	■	■	■	■	■	■	■	Completed visual inspections. Scheduled to start the detailed inspection on August 16
	Inspection of the fuel handling machines of Units 1 through 7	■	■				■	■	■	■	■	■	■	■	■	
	Inspection of the reactor core of Unit 1(Phase 1)						■	■	■	■	■	■	■	■	■	Scheduled to start the inspection as soon as preparations completed.
Preparation for opening of the turbine	Inspection of the overhead cranes of Units 1 through 7	■	■				■	■	■	■	■	■	■	■	■	Completed visual inspections. Under detailed inspection at Unit 2.
	Preparation for restoration of the Unit 3 reactor building blowout panel	■	■				■	■	■	■	■	■	■	■	■	
Restoration and inspection of facilities	Preparation for inspection of the main exhaust ducts of Units 1 through 5	■	■				■	■	■	■	■	■	■	■	■	Under preparation for the scaffolding and the rain curing Scheduled to start the inspection in the early September
	Treatment of leaked water at the 5 <sup>th</sup> basement floor in reactor combination building of Unit 1	■	■				■	■	■	■	■	■	■	■	■	Scheduled to be completed at the end of September
	Detailed inspection of the house transformer 3B	■	■				■	■	■	■	■	■	■	■	■	Under compilation of inspection and investigation results
	Repair and restoration of the low voltage start-up transformer (3SB/6SB)	■	■				■	■	■	■	■	■	■	■	■	3SB: Received power on August 10 6SB: Scheduled to be restored in the early September
	On-site investigation and inspection of the oil protection bank of transformer	■	■				■	■	■	■	■	■	■	■	■	
	Restoration of the fire protection system	■	■				■	■	■	■	■	■	■	■	■	Completed confirmation of the discharge function of the foam extinguishing system on August 10
	Restoration of roads and slopes inside and outside the station	■	■				■	■	■	■	■	■	■	■	■	
Plant facilities	Visual inspection of the plant main facilities and planning of detailed inspection	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Under working with sub contractors
	Regular inspection of the station facilities and restoration of the station site	■	■				■	■	■	■	■	■	■	■	■	

\*Inspection results of each facility will be reported as soon as they are rounded up.

\*Inspection and restoration works and their schedule for each item are subject to change.

**Information Release Criteria currently applied to Non-conforming Events found during the Inspection and Restoration Work of the Plants after “the Niigataken Chuetsu-oki Earthquake in 2007”.**

Classification	Example	Timing of release
Classification I (Mainly non-conformity grade As)	<ol style="list-style-type: none"> <li>1) Reporting events pursuant to the provision of Article 19-17 of the Rule for the Installation, Operation, etc. of Commercial Nuclear Power Reactors</li> <li>2) Reporting events pursuant to the provision of Article 3 of the Rule for Incident Report on the Electric Facilities</li> <li>3) Significant events which do not come under 1) or 2) but require a report pursuant to the Safety Agreement               <ol style="list-style-type: none"> <li>a. Non-conformity to the safety regulation;</li> <li>b. Theft or loss of radioactive isotope (Safety Agreement with Niigata Prefecture);</li> <li>c. Accident during the transportation of nuclear fuel material, objects contaminated by nuclear fuel material, or radioisotope (Safety Agreement with Niigata Prefecture);</li> <li>d. Occurrence of fire (Safety Agreement with Niigata Prefecture); or</li> <li>e. Access of a fire engine into the power station premises due to leakage of dangerous materials (though it will be treated as classification II if only business cars access the premises)</li> </ol> </li> </ol>	Immediately regardless of night time, or holiday
Classification II (Mainly non-conformity grade A)	Non-conformity to the requirements shown below excluding above; <ol style="list-style-type: none"> <li>1) Among the events shown below, those that are not so significant as to require a report pursuant to the law</li> </ol>	Same as above. If during night-time, next



	<ul style="list-style-type: none"> <li>a. Unplanned release of radioactive wastes from a duct or a drain; or</li> <li>b. Deviation from the limited condition for operation provided in the safety regulation</li> <li>2) Disorder accompanied by radioactive contamination of human body (except for the case where decontamination is possible.)</li> </ul>	<p>morning as soon as the release is ready</p>
<p>Classification III (Mainly non-conformity grade B)</p>	<p>Non-conformity to the requirements shown below excluding above;</p> <ul style="list-style-type: none"> <li>1) Insignificant failure (requiring simple repair) of equipment (equipments specified by METI- Notice 327) important to safety during operation;</li> <li>2) Failure of equipment that affects operation and requires large-scale repair work;</li> <li>3) Temporary lack of measurement due to a failure of duct monitor or environmental radioactive monitor of monitoring post;</li> <li>4) Detection of Iodine or particulate radioactive materials from duct sampling without fluctuation of readings in duct monitor;</li> <li>5) Leakage of radioactive materials were confirmed in the controlled area, but, (1) the leakage has stopped promptly by further tightening, (2) the leakage has been already stopped, or (3) the leakage did not go beyond a dam preventing expansion of the leakage. (Excluding the minuscule leakage whose amount is less than 1 liter. The leakage occurred while at work taking preventative measures does not come under the type of leakage stated above);</li> <li>6) Mixture or detection of foreign materials in the reactor, the spent fuel pool or the suppression pool, or occurrence of loose parts due to the failure of equipment;</li> <li>7) Confirmation of the leakage of over 200 liters of water (non-radioactive) inside the station buildings;</li> </ul>	<p>Any non-conforming event occurred during the previous day is compiled in the evening of the next day (for weekdays)</p>

	8) Conveyance of the injured person to a hospital; 9) Unplanned radiation exposure of more than 1mSv by workers; 10) Intake of a small amount of radioactive materials (Only when approved by the person himself); 11) The event informed to the concerned administrative agencies (Excluding a case that information was clearly false)	
Other (Mainly non-conformity grade C and D)	Other non-conformity to requirements	Once per week (weekly report)

\* The above examples will be revised as appropriate.