

Information of Kashiwazaki-Kariwa Power Plant (the 4th news)

1. On-site investigation by JANTI

The Japan Nuclear Technology Institute (JANTI) dispatched three staff members to the Kashiwazaki-Kariwa Nuclear Power Plant on July 23 and 24 to investigate the on-site status of the power station and its surrounding areas (the surrounding areas on July 23 and the power station itself on July 24). The following are the main findings of the investigation. We have confirmed that there are no particular problems with the main reactor units, and that the power station is in the state of shutdown safely.

(1) Situations at the power plant

- a. Of seven reactor units installed, three units were in operation (Units 3, 4 and 7), one unit was undergoing the process of start-up (Unit 2), and the remaining three units were in outage shutdown (Units 1,5 and 6) when the earthquake struck.
- b. The reactors in operation or under the startup process automatically scram as designed with no problems, in response to the signal indicating "Large" seismic acceleration.
- c. The automatic scram was followed on with the cold shutdown procedure, as stipulated in the manual. Currently, all seven reactor units, including those in outage shutdown, remain safely in the state of cold shutdown in accordance with the Safety Regulations. At all units, the instruments for gauging the level of radiation in reactor water and at exhaust stacks showed no irregular readings, indicating that there is no damage to nuclear fuels. The minute leakage of radioactive materials, reported at Unit 6 and Unit 7, has since stopped.
- d. The reactor and turbine buildings, designed with an advanced level of earthquake resistance, appeared to have maintained a sound state in our visual check (See Picture 1 to 4.). Facilities and structures with a relatively low level of earthquake resistance showed partial damage. Tokyo Electric Power Company is carefully examining the condition of each of the damaged sections one by one right now.
- e. The following are main situations confirmed in this investigation:

<Fire at the house transformer of Unit 3>

- The earthquake caused a fire at the house transformer of Unit 3. The station transformer, installed beside the turbine building, supplies electricity, generated at the unit, to equipment on the same premises.
- The base of the transformer's main unit is staked down to the rock foundation, and the turbine building on the supply side is also affixed to the rock bed. However, the support structure for the secondary duct linking the two facilities did not have rock-bed reinforcement. When the quake caused the ground underneath the support structure to sink (by approx. 30 centimeters), the conductor came in contact with the duct, triggering a short circuit and igniting leaked oil (See Picture 5.).
- The transformer is currently unusable. However, a separate startup transformer is being used to supply enough electricity to secure plant safety (See Picture 6.).

<Damage to the piping of the fire protection system at Unit 1>

- The earthquake caused damage to the piping of the fire protection system, installed outside the reactor combination building for Unit 1. Water, leaked from the piping, became combined with soil and sand, and seeped into the composite reactor building through the gaps in the piping housing. This left a pool of mud water, approximately 48 centimeters deep, on the fifth basement of the reactor combination building (See Picture 7 and 8).

- The basement floors of the reactor combination building house 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.

<Release of radioactive materials into the seawater at Unit 6>

- The jolts from the earthquake upset the water in the spent fuel storage pools of all reactor units, and overflowed onto the reactor buildings' operating floors (See Picture 9.).
- Of these cases, the flooded water at Unit 6 dripped through the gaps at the floor joins of a duct for passing through fuel exchanger's electrical cables, traveled through the cable duct, and reached non-controlled areas (See Picture 10.).
- Since seepage in non-controlled areas is normally uncontaminated with radiation, it is designed to be released to the outside environment with the storm drain system. The leaked water in this event was also channeled through this route, and pumped out into the sea.
- All overflow water from the spent fuel storage pool has been processed. On the day of the investigation, TEPCO was conducting a check on the air-tightness of the floor joins of the cable duct.

(2) Situations in the surrounding areas

a. Conditions of roads and ports

National Route No.8, a trunk road linking Nagaoka and Kashiwazaki cities, was closed after some sections collapsed in the earthquake, but was reopened for traffic on July 23 after round-the-clock restoration work. Many roads reported sinkage and the development of gaps at the approach to bridges and other structures, but swift restoration work has been conducted to minimize inconvenience to road users (See Picture 11 and 12.). No particular damage was observed at port facilities.

b. Conditions of residential buildings

Houses that collapsed were mostly old, wooden structures with tiled roofs. This inspection found concentration of damage in the township of Nishi-Honcho. As of July 23, a total of 961 houses were reportedly destroyed in the quake (See Picture 13.).

c. Other situations

While power supply has been restored, it appears the recovery of water supplies to the affected areas will take some more time, as indicated by the number of water trucks servicing the communities. A large number of SDF troops have been mobilized to engage in restoration work (See Picture 14 and 15.).

(3) Inspection staff's comments

The roof collapsed extensively at the power station's administration building, making it impossible to perform work there. Part of the emergency response office and meeting rooms have been set aside so that staff can identify the extent of damage and issue instructions on countermeasures (See Picture 16.).

The door to the emergency response office, set up in the administration building, was initially jammed, denying access to workers who tried to use the emergency phones there that had direct connections to the local government and local fire department. The suspension of water supplies means that most toilet facilities, with some exceptions, remain unavailable. These experiences provide a valuable lesson in formulating response to future emergencies.

Although it is expected to take a substantial amount of time to fully restore the power station, the morale of station workers appeared very high. JANTI staff felt their eagerness in wanting us to distribute correct information accurately and in a timely fashion to overseas and the rest of the Japanese population.

JANTI will continue to examine and investigate the status of the power station from a third-party standpoint,

and release relevant findings to external parties.

2. Other information

- (1) As of July 24, the power station newly identified damage to the shaft joint that drives the overhead crane in the reactor building of Unit 6. According to TEPCO, the main unit of the crane is supported by railings on both sides, and does not fall even if the shaft suffers damage.
- (2) Thus far, TEPCO has identified approximately 70 locations that suffered quake damage, and will continue with a detailed investigation.

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

Links for reference

Tokyo Electric Power Company <http://www.tepco.co.jp/en/index-e.html>

Nuclear and Industrial Safety Agency <http://www.nisa.meti.go.jp/english/index.htm>

Nuclear Safety Commission of Japan <http://www.nsc.go.jp/english/english.htm>