

# NUKE INFO TOKYO

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## KK-7 stopped due to radioactive leak KK-6 begins start-up tests



*Protesters against nuclear fuel shipment call for KK closure  
(Kashiwazaki City, September 15, 2009)*

**T**okyo Electric Power Company (TEPCO) was hoping that Unit 7 (ABWR, 1,356 MW) would soon be the first plant at its Kashiwazaki-Kariwa Nuclear Power Station (KK) to resume commercial operations since the July 2007 Chuetsu-oki Earthquake. However, on July 23, the day before the plant was scheduled to enter commercial operations, there was a leak of radioactivity in the reactor's primary circuit. It was suspected that the leak came from a damaged fuel rod. The governor of Niigata Prefecture responded by choosing to prioritize safety and public confidence. As a result, approval for commercial operation has been postponed for several months.

The reading for xenon-133 (a noble gas with a half life of 5.24 days) in the primary circuit, where steam or hot water flow from the reactor to the turbine through the condenser and back to the reactor, was found to be six times the normal level. The following day (July 24), the reading had increased to 450 times the normal level.

Apparently, the xenon-133 gas (a fission product) had escaped from a small hole in the casing of a fuel rod. Several questions arose as a result of the leak.

Was the hole formed as a result of the Chuetsu-oki Earthquake? Will it increase in size? Are there holes in any other fuel rods?

TEPCO claims that by inserting and withdrawing control rods it was able to identify the fuel assembly containing the leaking fuel rod. This assembly was not inspected before start-up tests began on May 8. KK-7 has 872 fuel assemblies, just 20 of which were inspected using an underwater camera. These visual inspections did not reveal any problems, but when two of these 20 fuel assemblies were further inspected using a fiberscope, foreign matter was discovered in one of the assemblies. This fuel assembly was removed and disposed of. Not surprisingly, TEPCO was criticized for the inadequacy of its original inspection.

The upshot is that KK-7 will not resume commercial operations as scheduled. The plant is currently undergoing tests at below full power. However, on September 1 TEPCO announced that it would not wait for the next scheduled periodic inspection, but that instead it would shut down the reactor at the end of the month to check the other fuel assemblies.

In March this year Niigata Prefecture's technical review committee allowed the plant to begin start-up tests, ignoring warnings from some committee members. Considering the way things have turned

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out, it is fair to state that the committee shares responsibility for the current situation. The experts who warned the committee in March have pointed out that unless the leaking fuel assemblies are taken apart, it will not be possible to find precisely where the radioactivity is coming from or the cause of the leak. Debate on the issue within the technical review committee and the subcommittee looking into equipment integrity and earthquake resistance is continuing.

Meanwhile, KK-6 began start-up tests on August 31. TEPCO intends to bring it up to full power by

mid September. The three local groups opposed to nuclear power, along with concerned citizens, are demanding that start-up tests be suspended until the investigations into KK-7's leaking fuel rod problem have been concluded. On September 4 they submitted demands to Niigata Prefecture and Kashiwazaki City for both KK-6 and KK-7 to be immediately shut down and for thorough inspections to be carried out.

Yukio Yamaguchi (CNIC Co-Director)

## Hamaoka Nuclear Power Station Struck By Earthquake

Chubu Electric Power Company's Hamaoka Nuclear Power Station was struck by a magnitude 6.5 earthquake at 5:07am on August 11. The epicenter was 37 kilometers from the Hamaoka plant in Suruga Bay, in Shizuoka Prefecture (see map). The depth of the earthquake source was 23km. By comparison, the epicenter of the M6.8 Chuetsu-oki Earthquake, which struck the Kashiwazaki-Kariwa Nuclear Power Station (KK) in July 2007, was 10km from the plant and the depth of the source was 10km.

Hamaoka-4 and -5 shut down automatically. At the time, adjustment operations were being carried out at Hamaoka-4, which was in the final stages of scheduled maintenance. Unit 5 had just completed scheduled maintenance two weeks earlier, while Unit 3 was still shut for scheduled maintenance. Units 1 and 2 were shutdown permanently in January this year (see NIT 128).

The maximum ground motion recorded at the base plate of each plant was as follows.

Plant	Unit 1 (BWR, 540MW)	Unit 2 (BWR, 840MW)	Unit 3 (BWR, 1,100MW)	Unit 4 (BWR, 1,137MW)	Unit 5 (ABWR, 1,380MW)
<b>Ground Motion</b>	109 Gal	109 Gal	147 Gal	163 Gal	426 Gal

The extraordinarily large ground motion recorded at Unit 5 was less than the 600 Gal "Extreme Design Earthquake" (S2) for the plant under the old seismic guidelines, or the 800 Gal "Design Basis Earthquake Ground Motion" (Ss) under the revised guidelines. However, the spectrograph readings submitted by Chubu Electric to the Nuclear Industrial and Safety Agency (NISA) showed that in the natural period range (0.35 - 0.45 second) the spectrograph recorded on the second floor basement of Unit 5 exceeded the "Maximum Design Earthquake" (S1) under the old seismic guidelines. Surprisingly, the ground motion

at the base plate of Hamaoka Unit 5 was larger than that the 322 Gal recorded at KK-6 and the 356 Gal at KK-7 (both ABWR, 1,356 MW) during the Chuetsu-oki earthquake, despite the fact that the latter earthquake was larger and the epicenter was much closer.

### Release of Radioactivity

On the day of the earthquake a radiation monitor in the fuel exchange area within the Unit 5 reactor building indicated that the radioactivity level was eight times higher than normal. The radioactivity concentration in the fuel pool water was measured at 10 Bq/cm<sup>3</sup>, which is fifty times the normal level of 0.2 Bq/cm<sup>3</sup>. Elevated radioactivity was also recorded in the fuel coolant purification pump room in the reactor building of Unit 2.

Chubu Electric initially said that no radiation was released. However, a release of radioactive iodine-131 (300,000 Bq) from Unit 5 was detected on August 19. According to Chubu Electric,

the radioactivity was noticed during the weekly replacement of an exhaust gas filter in the reactor. It claimed that the radioactivity concentration was three times higher than cautionary levels but lower than legally allowable levels.

### Damage

Chubu Electric said that initial visual inspections revealed no damage, but in subsequent reports it acknowledged that the earthquake had caused damage to the plants. An August 18 report identified a total of 46 problems, 25 of which related to Unit 5. Damage to Unit 5 included cracks in the walls