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Why Worry? Japan's Nuclear Plants at Grave Risk From Quake Damage

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I had warned that a major earthquake would strike the Chuetsu region around Kashiwazaki, Niigata Prefecture, and about the fundamental vulnerability of nuclear power plants.

The 6.8 magnitude tremor of July 16 caused considerable damage to the Kashiwazaki-Kariwa Nuclear Power plant operated by Tokyo Electric Power Co. (TEPCO), proving me right.

In the 40 years that Japan had been building nuclear plants, seismic activity was, fortunately or unfortunately, relatively quiet.

Not a single nuclear facility was struck by a big quake. The government, along with the power industry and the academic community, all developed the habit of underestimating the potential risks posed by major quakes.

Since around the time of the Great Hanshin Earthquake that devastated Kobe in 1995, however, almost the entire Japanese archipelago has entered a period of brisk seismic activity.

In the past two years, major quakes took place in close proximity of three nuclear power plants:

the Onagawa plant in Miyagi Prefecture (August 2005),

the Shika plant in Ishikawa Prefecture (March 2007) and

the Kashiwazaki-Kariwa plant.

In each case, the maximum ground motion caused by the quake was stronger than the seismic design criteria for the nuclear power plants.

The latest tremor near Kashiwazaki generated a peak ground acceleration of 993 gal, compared with the design value of 450 gal.



Map showing location of the Kashiwazaki-Kariwa plant

This is the kind of hazardous situation that a very quake-prone nation must expect to occasionally face when it operates so many nuclear reactors. There are, in fact, 55. (*Un peu moins qu'en France*)

What happened to the Kashiwazaki-Kariwa Nuclear Plant should not be described as "unexpected".

What happened there could have been much worse.

If the focus of the quake had been a little farther southwest, toward the plant site, and the magnitude had been 7.5--the size of a quake that hit Niigata Prefecture in 1964--and if all seven reactors at the plant had been operating, genpatsu-shinsai, a combination of an earthquake and a nuclear meltdown, could have occurred.

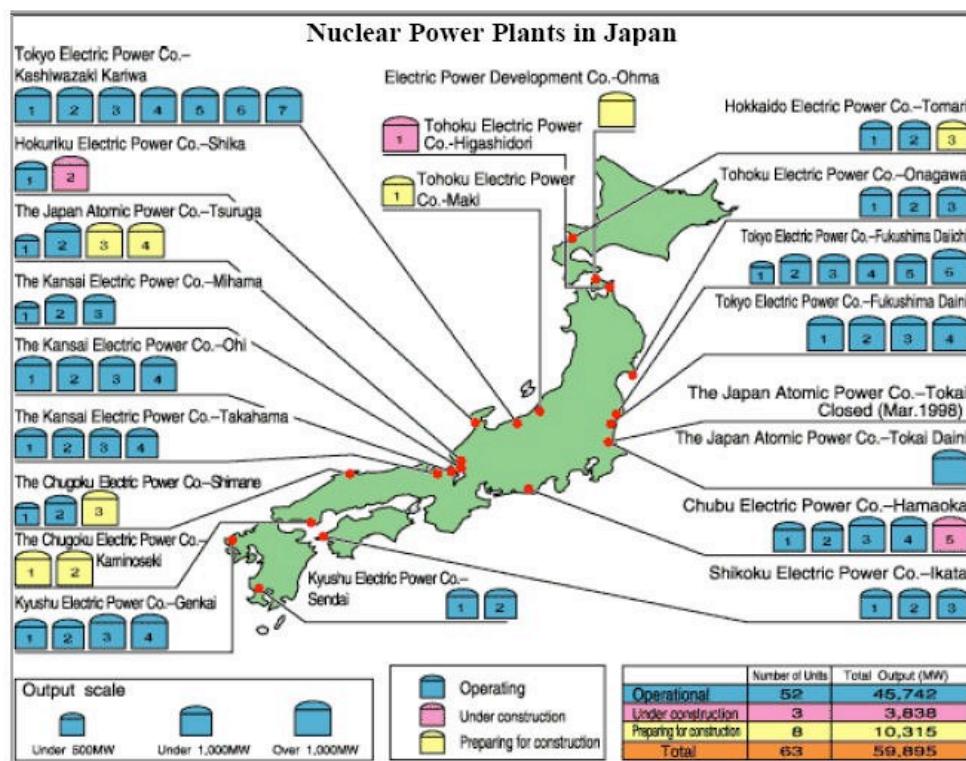


The Kashiwazaki-Kariwa plant

That would have been a catastrophic event where the damaging effects of the quake itself and radiation leaked from the plant reinforced each other.

The period of high-level seismic activity will continue for another 40 years or more. Unless radical steps are taken now to reduce the vulnerability of nuclear power plants to earthquakes, Japan could experience a true nuclear catastrophe in the near future.

The risk of such a nightmare is especially high for the Hamaoka Nuclear Power plant in Shizuoka Prefecture and the cluster of nuclear plants along Wakasa Bay in Fukui Prefecture. A serious accident at these facilities could have a profound effect on the three biggest metropolitan areas around Tokyo, Nagoya and Osaka.



Location of Japan's nuclear power plants (2006)

The latest tremor highlighted some fatal flaws in the old seismic design guidelines.

But even the new guidelines that took effect last September in the first sweeping revision in 28 years are still seriously flawed because they underestimate design basis earthquake ground motion.

I was a member of the expert panel that developed the new seismic design guidelines, but I resigned during the final stage of the work last August to protest the panel's stance on this issue.

This defect must be fixed quickly, learning from what happened at the Kashiwazaki-Kariwa plant.

TEPCO has been criticized for failing to sufficiently consider the submarine active faults near the plant. Many experts argue that thorough seismic research under the new guidelines will prevent such an oversight in future.

But a strong earthquake of up to about 7.3 magnitude could directly hit an area where even perfect seismic research could not discover an active fault line.

So the guidelines should require that a nuclear power plant, no matter where it

is located, should be designed to withstand at least the ground acceleration caused by an earthquake of about a 7.3 magnitude, roughly 1000 gal. In fact, however, the new guidelines require only about 450 gal.

This figure should be raised substantially, and all existing nuclear power plants should be examined rigorously according to the revised criteria.

The facilities that cannot be improved under the revised criteria should be shut down.

The most serious fact is that not only are the new design guidelines defective, but the system to enforce them is in shambles.

Much of the blame for the underestimation of the active fault line near the Kashiwazaki-Kariwa plant rests with the shoddy examination of TEPCO's design for the plant that overlooked the problem.

In The Asahi Shimbun's column on Sept. 16 last year, I pointed out that an active fault line had been overlooked in the process of designing the Shimane Nuclear Power Plant in Shimane Prefecture, a serious oversight in the safety inspection.

But no action has been taken to address the problem, demonstrating the irresponsibility of the nuclear safety authorities.

The expert who advised the power company and took part in the safety inspection--the person responsible for the underestimation of the fault line--is still in an important position on the panel of the Nuclear and Industrial Safety Agency.

A senior agency official recently said there will be no new review of the seismic design guidelines, at least for the time being.

But the guidelines are under the jurisdiction of the Nuclear Safety Commission, which is supposed to be an independent and neutral regulatory organization.

By saying so, the official overstepped his authority, and his remarks clearly demonstrated how the commission is susceptible to government intervention.

All these facts add up to a policy failure as serious as the blunders that led to the HIV-tainted-blood scandal and the recent pension record-keeping mess.

The Diet should take a good look into the government's flawed nuclear safety policy along with the problems caused by the recent earthquake for a radical reform of the government approach to ensuring the safety of nuclear power plants.

Otherwise, there can be no viable future for Japan's nuclear safety.

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