PHOTO BY KAZUYA ASANO

Hiromitsu Ino, professor emeritus at Tokyo University and a member of Nuclear Power Citizens Committee, was born in 1938 in Tokyo. He is a director of "Society of scientists and technicians calling for the closures of Kashiwazaki Kariwa Nuclear Power Plant" and specializes in metallic material engineering and copper embrittlement caused by neutron exposure.

Working to stop nuclear power stations in Japan

Allowing plants to restart would ignore lessons learned from Fukushima, expert says

BY RIE MATSUOKA
CONTRIBUTING WRITER

More than four years after the Fukushima disaster, no nuclear power plants have operated in Japan. At least that was the case until August 2015, when the Sendai nuclear plant in southern Japan became the first to begin operation since the 2011 Fukushima meltdowns, despite anti-nuclear protests.

An additional 23 units in 14 nuclear power plants are applying for the green light to resume operations. To do this, they must pass a safety review conducted by Japan's Nuclear Regulation Authority.

But the plan to resume nuclear operations fails to reflect on the lessons we have learned from Fukushima, warns Hiromitsu Ino, a former Tokyo University professor and specialist in metallic material engineering.

"At the moment, the Abe government is attempting to revive nuclear power stations and trying to return the evacuated inhabitants to their home. However, we do not have any clear plan to restore the damaged area yet. We must use our experience of the Fukushima accident as the base when we consider the future," says Ino, who has already raised major concerns over the risks involved in resuming nuclear operations across the country.

"First of all, I want to emphasize that the common sense of the nuclear power community is senseless for citizens, and the common sense of citizens is senseless for the nuclear power community," says Ino. "During the Fukushima accident, all the external power was cut down and the internal emergency diesel generators were also damaged. We wonder why they had not made the external power more earthquake resistant, but for them our idea looks senseless."

Ino points out that cost is also a big factor playing out behind the scenes: "In order to enhance the entire plant's level of earthquake resistance, you must make the whole system within and around the premises earthquake resistant, including pylons, wiring and the thermal power plant itself, which would cost a huge amount of money. That is why power companies are not willing to do it."

Nuclear power plants are built taking into consideration not only safety but also the balance of safety, costs (economic efficiency), performance and environmental burden, among other factors. "This sense of balance applies not only to a nuclear power plant, but also to many other things," says Ino. "However, if and when a nuclear power plant has an accident, the damage is enormous. We need to emphasize safety by all means. But they evaluate the balance at the same level as in any other technology. It is both ridiculous and dangerous to resume a nuclear power plant in this situation."

Commenting on the nuclear power plants built in the 1970s, Ino says, "The design concept is bad and the materials are also bad. They are built based on the assumption of an operating life of 30 to 40 years. Such common material as stainless steel were used. The material of pressure containers contains copper impurities. When neutrons hit the containers, copper fuses together and forms clusters, making that part stiff, brittle and therefore easier to break."

The boundary temperature before a material breaks is called "brittle transition temperature." For example, copper's brittle transition temperature is usually about minus 20 degrees centigrade, but as the material gets older the brittle transition temperature rises. The worst is 99 degrees in Unit 1 of Takahama Nuclear Power Plant, followed by 98 degrees in Unit 1 of Genkai Nuclear Power Plant.

The higher the brittle transition temperature; the higher the risk of the container breaking. Additionally, when the core cooling system functions as an emergency measure and cold water flows into the container, only the inside part of the container is rapidly cooled down. The temperature difference between inside and outside could generate some force and break the container from inside.

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"If the pressure container is broken, we can no longer cool it down with water," explains Ino. "The meltdown will surely start. If there is hydrogen around, there is a risk of explosion as well. When the containment vessel is blown away, the radioactive substances will disperse in the area of 250 kilometers in radius, causing damage much more serious than the Fukushima Daiichi accident."

Unit 1 of Genkai Nuclear Power Plant has been officially decommissioned, but there are still hopes that Unit 1 of Takahama Nuclear Power Plant could once again become active. "The reason is that while the output power of Genkai is relatively small, 50 kW, that of Takahama is nearly

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