

Fukushima: 'Melt-through' rather than meltdown?

Thursday 9 June 2011, by [Asahi Shimbun](#), [Jiji Press](#), [Yomiuri Shimbun](#) (Date first published: 8 June 2011).

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'Melt-through' at Fukushima? / Govt report to IAEA suggests situation worse than meltdown

Nuclear fuel in three reactors at the Fukushima No. 1 nuclear plant has possibly melted through pressure vessels and accumulated at the bottom of outer containment vessels, according to a government report obtained Tuesday by The Yomiuri Shimbun.

A “melt-through”—when melted nuclear fuel leaks from the bottom of damaged reactor pressure vessels into containment vessels—is far worse than a core meltdown and is the worst possibility in a nuclear accident.

The possibility of the situation at the plant's Nos. 1 to 3 reactors was raised in a report that is to be submitted to the International Atomic Energy Agency.

If the report is released as is, it would be the first official recognition that a melt-through has occurred.

It was revealed earlier that sections of the bottom of the pressure vessels where control rods go through have been damaged. Highly radioactive water from inside the pressure vessels was confirmed to have leaked out of the containment vessels, even outside the buildings that house the reactors.

The report also acknowledges problems with the vertical administrative structure concerning nuclear safety regulations. As a result, the report says, who was responsible for keeping people safe in the event of a nuclear accident was not clear.

The report proposes separating the Nuclear and Industrial Safety Agency from the Economy, Trade and Industry Ministry and making it an independent organization. The report also proposes drastic reform of the nation's nuclear administration, including the Nuclear Safety Commission.

TEPCO faces prolonged battle against radioactive debris, water

As workers struggle to bring the Fukushima No. 1 nuclear power plant under control, signs are increasing that the eventual cleanup of the disaster will take much longer than previously thought.

Containers of rubble, unwanted and of unknown levels of contamination, line the roadside near the plant. Pools of radioactive water at the plant, a constant problem since the March 11 disaster, may pose even longer-term challenges. And full studies on how to remove nuclear fuel and eventually decommission the four troubled reactors have yet to start.

Tokyo Electric Power Co., the plant's operator, started using remote-controlled, unmanned heavy machinery in late April to put radioactive debris into containers each with a capacity of about 4 cubic meters.

By June 5, 279 containers had been filled.

"We don't know where we can take the containers," said a TEPCO spokesman.

In fact, the spokesman said the company has no idea about the aggregate volume of the debris nor the amount of radiation for each container.

TEPCO planned to complete work to remove the rubble within three months, but officials now say that no end is in sight.

One plausible receiver is Japan Nuclear Fuel Ltd., which accepts low-level radioactive waste from electric power companies at its facility in Aomori Prefecture.

But an official said the company cannot decide on whether to accept radioactive debris unless the amount of radiation and the types of radioactive materials are known.

The debris at the Fukushima plant includes concrete fragments of reactor buildings that were blown off in hydrogen explosions as well as rubble washed ashore by the March 11 tsunami.

Radiation levels of some pieces measured more than 1,000 millisieverts per hour, a level that could cause acute disorders if workers are in close proximity for a long time.

While workers at the Fukushima plant may be exposed to an accumulated maximum of 250 millisieverts, radiation of up to 20 millisieverts per

hour was observed in the atmosphere around the No. 1 to 4 reactors as of May 27.

What to do with highly radioactive water is also a growing concern for TEPCO. Such water at the Fukushima plant is expected to increase to 200,000 tons in December, nearly double the 105,100 tons as of the end of May.

The water currently contains radioactivity of 720,000 terabecquerels, more than the 370,000-630,000 terabecquerels estimated to have been released into the atmosphere.

The central waste treatment facility, which is capable of holding 14,000 tons of water, is nearly full.

The capacity at the facility and other containers will be increased by 4,300 tons, but the increased space will be filled by June 20.

TEPCO is injecting a huge amount of water to cool the reactors and the storage pools for spent nuclear fuel rods. Radioactive water is believed to be leaking from holes in the pressure vessels and containment vessels of the reactors.

Using technology of France's Areva SA, a system will be completed on June 15 that can reduce the radioactivity of contaminated water to one-1,000th by removing cesium and strontium. The water can then be reused to cool the reactors or be stored at tanks for water with low radioactivity.

But the system is capable of treating only up to 1,200 tons a day.

The water treatment system and another system to remove radioactive materials, developed by Japanese and U.S. companies, are expected to cost a total of 53.1 billion yen (\$662 million).

However, it is still undecided how to dispose of the radioactive substances removed from the water.

"We will consider treatment technology and regulations," said Hidehiko Nishiyama, a senior official at the Nuclear and Industrial Safety Agency. "It will take years (to treat radioactive materials)."

Another huge challenge is how to dispose of nuclear fuel that remains in the reactors and the storage pools.

The No. 1 to 3 reactors contained 1,496 fuel assemblies, or clusters of fuel rods, while the storage pools for the No. 1 to 4 reactors held 3,108 fuel assemblies.

An estimated five to 10 years are needed to remove the nuclear fuel from the reactors after they reach a stable cold shutdown state.

TEPCO said it plans to decommission the No. 1 to 4 reactors.

"We have not made full-fledged studies on how to decommission the reactors," said Junichi Matsumoto, acting general manager of TEPCO's Nuclear Power and Plant Siting Division.

Toshiba Corp., which designed the Fukushima plant, announced plans in April to remove fuel in five years and decommission reactors in slightly more than 10 years.

But a paper carried in the online edition of Britain's Nature magazine soon after Toshiba's announcement said decommissioning work would take decades, even 100 years.

The paper quoted "veterans of cleanup operations" as saying that many more years will be needed at Fukushima than the 11 years required to remove fuel after the accident at the Three Mile Island nuclear power plant.

It also pointed out that following a fire in 1957 at a nuclear facility in Sellafield, Britain, the reactor remained as it was for 20 years.

But TEPCO will be under pressure to remove the fuel quickly because another major earthquake or tsunami could cause the release of radioactive materials from the reactors.

TEPCO also must come up with new disposal measures because it is difficult to transport damaged nuclear fuel to the reprocessing facility in Aomori Prefecture.

Another problem is how to dispose of the pressure vessels, containment vessels and piping systems that are all contaminated with high levels of radioactivity.

(This article was compiled from reports by Shunsuke Kimura, Jin Nishikawa, Eisuke Sasaki and Hidenori Tsuboya.)

Asahi Shimbun , June 7, 2011

<http://www.asahi.com/english/TKY201106060179.html>

Institute Wants Dosimeters Distributed to Fukushima Residents

Tokyo, June 7 (Jiji Press)—Japan's National Cancer Center said Tuesday dosimeters should be distributed to residents of areas with relatively high levels of radiation emitted from a crippled nuclear power plant.

The organization stressed the need to measure radiation doses of those under 20 as well as farmers and other people who work outdoors. The request comes as there is little available data on the risk of cancer from exposure to radiation over long periods.

There are areas, known as “hot spots,” that have high levels of radiation even though they are not close to the Fukushima No. 1 nuclear power plant.

Dosimeters should be provided to residents—whether it is one for each family or one for every 10 children—so as to trace patterns of radiation exposure in everyday lives, National Cancer Center Chief Director Takamasa Kayama said at a news conference.

Jiji Press, June 7, 2011

<http://jen.jiji.com/jc/eng?g=eco&k=2011060700955>
