

Announcement of “Cold Shutdown” of Fukushima Reactors Is Based On a Political Decision, Not Science

By [Washington's Blog](#)

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If The Reactors Are “Cold”, It May Be Because Most of the Hot Radioactive Fuel Has Leaked Out

The Japanese Government and Tepco say that they have achieved a “cold shutdown” of Fukushima nuclear reactors. Specifically, they claim that the water inside the reactors is now below the boiling point.

In reality, no one knows what’s really going on inside the reactors.

A representative of the U.S. Nuclear Regulatory Commission says [it doesn't know what's going on inside the reactors](#) (video at link).

NHK reports:

- At Reactor No. 1 they believe most of the molten fuel has fallen from the pressure vessel to the bottom of the containment vessel where there is no thermometer
- The amount of water has not been measured accurately with a water gauge and has only been guessed at
- Tepco has installed systems to test for new “criticalities” – i.e. new nuclear reactions – in Reactors No. 1 and 2, but hasn’t done so in No. 3 – so no one can even tell if there are ongoing reactions in No. 3

By way of background, the New York Times [noted](#) on November 30th:

“This is still an overly optimistic simulation,” said Hiroaki Koide, an assistant professor of physics at the Kyoto University Research Reactor Institute, who has been a vocal critic of Tepco’s lack of disclosure of details of the disaster. Tepco would very much like to say that the outermost containment is not completely compromised and that the meltdown stopped before the outer steel barrier, he said, “but even by their own simulation, it’s very borderline.”

“I have always argued that the containment is broken, and that there is the

danger of a wider radiation leak,” Mr. Koide said. “In reality, it’s impossible to look inside the reactor, and most measurement instruments have been knocked out. So nobody really knows how bad it is.”

Tepco now assumes that “100 percent of the fuel at Unit 1 has slumped” into the outer primary containment vessel.

In addition, the simulation suggests that the fuel bored more than two feet into the concrete, Mr. Matsumoto said.

The Guardian [pointed out](#) on December 2nd:

Fuel rods inside one of the reactors at the Fukushima Daiichi nuclear power plant may have completely melted and bored most of the way through a concrete floor, the reactor’s last line of defence before its steel outer casing, the plant’s operator said.

“Uncertainty involved in the analysis is significant, due to the uncertain nature of the original conditions and data used,” Tepco said in a report. It said the concrete “could have been penetrated”, but added that the fuel remained inside the reactor’s outer casing.

AP [wrote](#) on December 9th:

Some nuclear experts, however, question that claim because the nuclear fuel moved as it melted, so its condition and locations are little known.

AP [noted](#) on December 13th:

The government said Fukushima Dai-ichi has reached cold shutdown “conditions”_ a cautious phrasing reflecting the fact that TEPCO cannot measure the temperatures of melted fuel in the damaged reactors in the same way as with normally functioning ones.***

The complex still faces numerous concerns, triggering criticism that the announcement of “cold shutdown conditions” is based on a political decision rather than science. Nobody knows exactly where and how the melted fuel ended up in each reactor

As Mainichi Daily [notes](#) today:

We can only deduce that the “conclusion” of the crisis, rather than being based on scientific evidence, comes from placing priority on a political decision to create the impression that the crisis has been brought under control quickly.

The latest announcement that the goals of the road map have been achieved is merely the result of officials lowering their own hurdles. It reminds me of the

time during World War II when the Imperial Japanese Army headquarters called the Japanese army's retreat a "shift in position."

In a news conference on Dec. 16, TEPCO President Toshio Nishizawa called the completion of the road map for bringing the crisis under control a "milestone," but a "milestone" achieved merely by lowering one's own targets is meaningless.

Mainichi cites two examples:

One of the goals that TEPCO initially announced for step 2 was filling the reactor containment vessels with water. However, the utility abandoned this plan after it emerged that there were holes in the containment vessels. Eventually, officials decided to delay such measures for five years or more.

The company also established a goal under step 2 of "dealing with and reducing the amount of radioactive water" on the site, but when the road map was rewritten, it was decided that there would "ongoing treatment" of contaminated water after the completion of other processes.

Tepco has admitted that the fuel is under the containment vessels, and that corium – a radioactive substance present at Fukushima – [attacks concrete](#).

Indeed, [ongoing nuclear reactions have been confirmed](#) in a variety of ways.

And the New York Times [pointed out](#) last month:

The unexpected bursts — something akin to flare-ups after a major fire ... threaten to increase the amount of dangerous radioactive elements leaking from the complex and complicate cleanup efforts, raising startling questions about how much remains uncertain at the plant....

The plant's owner admitted for the first time that fuel deep inside three stricken plants was probably continuing to experience bursts of fission.

It is impossible to determine exactly what state the fuel is in, given that even an intact reactor can offer only limited gauges in the form of temperature, pressure readings and neutron flow, but not visual observation. That lack of clarity is one of the most resonant lessons of the Fukushima disaster, where those trying to guide the response and assess the danger operated by what amounted to educated guesswork.

In reactors of the design used at Fukushima, that chain reaction is normally stopped when the operator gives a command to insert control rods, which rise up from the bottom of the core and separate the fuel assemblies. But when the cores of three reactors at Fukushima melted, a large part of the fuel presumably formed a jumbled mass in the bottom of the vessel, and without a strict gridlike geometry, the control rods cannot be inserted. Some of the fuel has escaped the vessel, experts believe, and is in spaces underneath, where

there is no way to use control rods to interrupt the flow of neutrons.

The three reactors — together with spent fuel rods stored at a fourth damaged reactor — have been leaking radioactive material since the initial disaster, and new episodes of fission would only increase their dangers.

“Re-criticality would produce more harmful radioactive material, and because the reactors are damaged, there would be a danger of a leak,” said Hiroaki Koide, assistant professor at Kyoto University’s Research Reactor Institute, whose prescient warnings about nuclear safety have won him respect in Japan.

Mr. Koide holds that the nuclear fuel at the three reactors probably melted through containments and into the ground, raising the possibility of contaminated groundwater. If much of the fuel was indeed in the ground early in the crisis, the “feed and bleed” strategy initially taken by Tokyo Electric — where workers pumped cooling water into the reactors, producing hundreds of tons of radioactive runoff — would have prevented fuel still in the reactor from boiling itself dry and melting, but would not have done anything to reduce danger from fuel already in the soil — if it got that far.

Tokyo Electric does not deny the possibility that the fuel may have burrowed into the ground, but its officials say that “most” of the fuel likely remains within the reactor, albeit slumped at the bottom in a molten mass.

But even in their most dire assessments, some experts had not expected even bursts of re-criticality to occur, because it was unlikely that the fuel would melt in just the right way — and that another ingredient, water, would be present in just the right amounts — to allow for any nuclear reaction. If episodes of fission at Fukushima were confirmed, Mr. Koide said, “our entire understanding of nuclear safety would be turned on its head.”

Some nuclear experts have debated for months whether nuclear reactions might be continuing, either in the fuel inside the reactors, or in the spent fuel pools at the plant. They have pointed, for example, to the continued reports of short-lived iodine in the spent fuel pool at Reactor No. 3.

A former nuclear engineer with three decades of experience at a major engineering firm ... who has worked at all three nuclear power complexes operated by Tokyo Electric ... said that tiny fuel pellets could have been carried to different parts of the plant, like the spaces under the reactor during attempts to vent them in the early days. That would explain several cases of lethally high radiation readings found outside the reactor cores.

“If the fuel is still inside the reactor core, that’s one thing,” he said. But if the fuel has been dispersed more widely, then we are far from any stable shutdown.”

Indeed, if the center of the reactors are in fact relatively “cold”, it may be because most of the hot radioactive fuel has leaked out of the containment vessels and escaped into areas where it can do damage to the environment.

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