

# The REAL Fukushima Danger: Failure of Fuel Pools Could Trigger Worldwide Nuclear Radiation

By [Washington's Blog](#)

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The fact that the Fukushima reactors have been leaking huge amounts of radioactive water [ever since the 2011 earthquake](#) is certainly newsworthy. As are the facts that:

- Tepco [doesn't know how to stop the leaks](#)
- Scientists have [no idea where the cores of the nuclear reactors are](#)
- Radiation could hit Korea, China and the [West Coast of North America](#) *fairly hard*

But the real problem is that the [idiots who caused](#) this mess are probably about to cause a *much bigger* problem.

Specifically, the [greatest short-term threat to humanity](#) is from the *fuel pools* at Fukushima.

If one of the pools collapsed or caught fire, it could have severe adverse impacts not only on Japan ... but the rest of the world, including the United States. Indeed, a Senator called it a [national security concern for the U.S.](#):

The radiation caused by the failure of the spent fuel pools in the event of another earthquake could reach the West Coast within days. That absolutely makes the safe containment and protection of this spent fuel a security issue for the United States.

Nuclear expert [Arnie Gundersen](#) and physician [Helen Caldicott](#) have both said that people should evacuate the Northern Hemisphere if one of the Fukushima fuel pools collapses. Gundersen said:

Move south of the equator if that ever happened, I think that's probably the lesson there.

Former U.N. adviser Akio Matsumura calls removing the radioactive materials from the Fukushima fuel pools ["an issue of human survival"](#).

So the stakes in decommissioning the fuel pools are high, indeed.

But in 2 months, Tepco – the knuckleheads who caused the accident – are going to start doing this very difficult operation on their own.

The New York Times [reports](#):

Thousands of workers and a small fleet of cranes are preparing for one of the latest efforts to avoid a deepening environmental disaster that has China and other neighbors increasingly worried: removing spent fuel rods from the damaged No. 4 reactor building and storing them in a safer place.

The Telegraph [notes](#):

Tom Snitch, a senior professor at the University of Maryland and with more than 30 years' experience in nuclear issues, said "[Japan officials] need to address the real problems, the spent fuel rods in Unit 4 and the leaking pressure vessels," he said. "There has been too much work done wiping down walls and duct work in the reactors for any other reason than to do something.... This is a critical global issue and Japan must step up."

The Japan Times [writes](#):

In November, Tepco plans to begin the delicate operation of removing spent fuel from Reactor No. 4 [with] radiation equivalent to 14,000 times the amount released by the Hiroshima atomic bomb. .... It remains vulnerable to any further shocks, and is also at risk from ground liquefaction. Removing its spent fuel, which contains deadly plutonium, is an urgent task.... The consequences could be far more severe than any nuclear accident the world has ever seen. If a fuel rod is dropped, breaks or becomes entangled while being removed, possible worst case scenarios include a big explosion, a meltdown in the pool, or a large fire. Any of these situations could lead to massive releases of deadly radionuclides into the atmosphere, putting much of Japan — including Tokyo and Yokohama — and even neighboring countries at serious risk.

CNBC [points out](#):

The radioactive leak at Japan's Fukushima nuclear plant is far from under control and could get a lot worse, a nuclear energy expert, who compiles the annual "World Nuclear Industry Status Report" warned.

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The big danger – and it was identified by Japan's atomic energy commission – is if you lose water in one of the spent fuel pools and you get a spent fuel fire.

CNN [reports](#):

[Mykle Schneider, nuclear consultant:] The situation could still get a lot worse. A massive spent fuel fire would likely dwarf the current dimensions of the catastrophe and could exceed the radioactivity releases of Chernobyl dozens of times. First, the pool walls could leak beyond the capacity to deliver cooling water or a reactor building could collapse following one of the hundred of aftershocks. Then, the fuel cladding could ignite spontaneously releasing its entire radioactive inventory.

Reuters [notes](#):

The operator of Japan's crippled Fukushima nuclear plant is preparing to remove 400 tons of highly irradiated spent fuel from a damaged reactor building, a dangerous operation that has never been attempted before on this scale.

Containing [radiation](#) equivalent to 14,000 times the amount released in the atomic bomb attack on Hiroshima 68 years ago, more than 1,300 used fuel rod assemblies packed tightly together need to be removed from a building that is vulnerable to collapse, should another large earthquake hit the area.

Tokyo Electric [Power](#) Co (Tepco) is already in a losing battle to stop radioactive water overflowing from another part of the facility, and experts question whether it will be able to pull off the removal of all the assemblies successfully.

"They are going to have difficulty in removing a significant number of the rods," said Arnie Gundersen, a veteran U.S. nuclear engineer and director of Fairewinds [Energy Education](#), who used to build fuel assemblies.

The operation, beginning this November at the plant's Reactor No. 4, is fraught with danger, including the possibility of a large release of radiation if a fuel assembly breaks, gets stuck or gets too close to an adjacent bundle, said Gundersen and other nuclear experts.

That could lead to a worse disaster than the March 2011 nuclear crisis at the Fukushima plant, the world's most serious since Chernobyl in 1986.

No one knows how bad it can get, but independent consultants Mycle Schneider and Antony Froggatt said recently in their World Nuclear Industry Status Report 2013: "Full release from the Unit-4 spent fuel pool, without any containment or control, could cause by far the most serious radiological disaster to date."

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The utility says it recognizes the operation will be difficult but believes it can carry it out safely.

Nonetheless, Tepco inspires little confidence. Sharply criticized for failing to protect the Fukushima plant against natural disasters, its handling of the crisis since then has also been lambasted.

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The process will begin in November and Tepco expects to take about a year removing the assemblies, spokesman Yoshikazu Nagai told Reuters by e-mail. It's just one installment in the decommissioning process for the plant forecast to take about 40 years and cost \$11 billion.

Each fuel rod assembly weighs about 300 kilograms (660 pounds) and is 4.5 meters (15 feet) long. There are 1,331 of the spent fuel assemblies and a further 202 unused assemblies are also stored in the pool, Nagai said.

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Spent fuel rods also contain plutonium, one of the most toxic substances in the universe, that gets formed during the later stages of a reactor core's operation.

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"There is a risk of an inadvertent criticality if the bundles are distorted and get too close to each other," Gundersen said.

He was referring to an atomic chain reaction that left unchecked could result in a large release of radiation and heat that the fuel pool cooling system isn't designed to absorb.

"The problem with a fuel pool criticality is that you can't stop it. There are no control rods to control it," Gundersen said. "The spent fuel pool cooling system is designed only to remove decay heat, not heat from an ongoing nuclear reaction."

The rods are also vulnerable to fire should they be exposed to air, Gundersen said. [The pools have already [boiled due to exposure to air](#).]

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Tepco has shored up the building, which may have tilted and was bulging after the explosion, a source of global concern that has been raised in the U.S. Congress.

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The fuel assemblies have to be first pulled from the racks they are stored in, then inserted into a heavy steel chamber. This operation takes place under water before the chamber, which shields the radiation pulsating from the rods, can be removed from the pool and lowered to ground level.

The chamber is then transported to the plant's common storage pool in an undamaged building where the assemblies will be stored.

[Here is a [visual tour of Fukushima's fuel pools](#), along with graphics of how the rods will be removed.]

Tepco confirmed the Reactor No. 4 fuel pool contains debris during an investigation into the chamber earlier this month.

Removing the rods from the pool is a delicate task normally assisted by computers, according to Toshio Kimura, a former Tepco technician, who worked at Fukushima Daiichi for 11 years.

"Previously it was a computer-controlled process that memorized the exact locations of the rods down to the millimeter and now they don't have that. It has to be done manually so there is a high risk that they will drop and break one of the fuel rods," Kimura said.

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Corrosion from the salt water will have also weakened the building and equipment, he said.

And if another strong earthquake strikes before the fuel is fully removed that topples the building or punctures the pool and allow the water to drain, a spent fuel fire releasing more radiation than during the initial disaster is possible, threatening about Tokyo 200 kilometers (125 miles) away.

[Richard Tanter](#), expert on nuclear power issues and professor of international relations at the University of Melbourne:

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Reactor Unit 4, the one which has a very large amount of stored fuel in its fuel storage pool, that is sinking. According to former prime Minister Kan Naoto, that has sunk some 31 inches in places and it's not uneven. This is really not surprising given what's happened in terms of pumping of water, the aftermath of the earthquake and the tsunami, the continuing infusions of water into the groundwater area. This is an immediate problem, and if it is not resolved there is an extraordinary possibility we really could be back at March 2011 again because of the possibility of a fission accident in that spent fuel pond in Unit No. 4.

Xinua [writes](#):

Mitsuhei Murata, a former Japanese ambassador to Switzerland has officially called for the withdrawal of Tokyo's Olympic bid, due to the worsening crisis at Fukushima, which experts believe is not limited to storage tanks, but also potential cracks in the walls of the spent nuclear fuel pools.

Japan Focus [points out](#):

The spent-fuel pool ... was damaged by the earthquake and tsunami, and is in a deteriorating condition. It remains vulnerable to any further shocks, and is also at risk from ground liquefaction.

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If a fuel rod is dropped, breaks or becomes entangled while being removed, possible worst case scenarios include a big explosion, a meltdown in the pool, or a large fire.

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This is literally a matter of national security – another mistake by TEPCO could have incredibly costly, even fatal, consequences for Japan.

### [Like Pulling Cigarettes Out of a Crumpled Pack](#)

Fuel rod expert Arnie Gundersen – a nuclear engineer and former senior manager of a nuclear power company which *manufactured* nuclear fuel rods – recently [explained](#) the biggest problem with the fuel rods (at 15:45):

I think they're belittling the complexity of the task. If you think of a nuclear fuel rack as a pack of cigarettes, if you pull a cigarette straight up it will come out — but these racks have been distorted. Now when they go to pull the cigarette straight out, it's going to likely break and release radioactive cesium and other gases, xenon and krypton, into the air. I suspect come November, December, January we're going to hear that the building's been evacuated, they've broke a fuel rod, the fuel rod is off-gassing.

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I suspect we'll have more airborne releases as they try to pull the fuel out. If they pull too hard, they'll snap the fuel. I think the racks have been distorted, the fuel has overheated — the pool boiled — and the net effect is that it's likely some of the fuel will be stuck in there for a long, long time.

In another interview, Gundersen [provides additional details](#) (at 31:00):

The racks are distorted from the earthquake — oh, by the way, the roof has fallen in, which further distorted the racks.

The net effect is they've got the bundles of fuel, the cigarettes in these racks, and as they pull them out, they're likely to snap a few. When you snap a nuclear fuel rod, that releases radioactivity again, so my guess is, it's things like krypton-85, which is a gas, cesium will also be released, strontium will be released. They'll probably have to evacuate the building for a couple of days. They'll take that radioactive gas and they'll send it up the stack, up into the air, because xenon can't be scrubbed, it can't be cleaned, so they'll send that radioactive xenon up into the air and purge the building of all the radioactive gases and then go back in and try again.

It's likely that that problem will exist on more than one bundle. So over the next year or two, it wouldn't surprise me that either they don't remove all the fuel because they don't want to pull too hard, or if they do pull too hard, they're likely to damage the fuel and cause a radiation leak inside the building. So that's problem #2 in this process, getting the fuel out of Unit 4 is a top priority I have, but it's not going to be easy. Tokyo Electric is portraying this as easy. In a normal nuclear reactor, all of this is done with computers. Everything gets pulled perfectly vertically. Well nothing is vertical anymore, the fuel racks are distorted, it's all going to have to be done manually. The net effect is it's a really difficult job. It wouldn't surprise me if they snapped some of the fuel and they can't remove it.

And Chris Harris — a former licensed Senior Reactor Operator and engineer — [notes](#) that it doesn't help that a lot of the rods are in very fragile condition:

Although there are a lot of spent fuel assemblies in there which could achieve criticality — there are also 200 new fuel assemblies which have equivalent to a full tank of gas, let's call it that. Those are the ones most likely to go critical first.

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Some pictures that were released recently show that a lot of fuel is damaged, so when they go ahead and put the grapple on it, and they pull it up, it's going to fall apart. The boreflex has been eaten away; it doesn't take saltwater very good.

## [Like Letting a Murderer Perform Brain Surgery On a VIP](#)

What's the bottom line?

Tepco has an *abysmal* track record:

- [Engineers warned Tepco and the Japanese government many years before the accident](#) that the reactors were seismically unsafe ... and that an earthquake

could wipe them out

- The Fukushima reactors were [fatally damaged before the tsunami hit ... the earthquake took them out even before the tidal wave hit](#)
- An official Japanese government investigation concluded that the Fukushima accident was a [“man-made” disaster, caused by “collusion” between government and Tepco and bad reactor design](#)
- Tepco knew right after the 2011 accident that [3 nuclear reactors had lost containment](#), that the nuclear fuel had [“gone missing”](#), and that there was in fact [no real containment](#) at all. Tepco has desperately been trying to cover this up for 2 and a half years ... instead [pretending](#) that the reactors were in “cold shutdown”
- Tepco just admitted that it’s [known for 2 years](#) that massive amounts of radioactive water are leaking into the groundwater and Pacific Ocean
- Tepco - with [no financial incentive](#) to actually fix things - has only been [pretending](#) to clean it up. And [see this](#)
- Tepco’s recent attempts to solidify the ground under the reactors using chemicals has [backfired horribly](#). And NBC News [notes](#): “[Tepco] is considering freezing the ground around the plant. Essentially building a mile-long ice wall underground, something that’s never been tried before to keep the water out. One scientist I spoke to dismissed this idea as grasping at straws, just more evidence that the [power](#) company failed to anticipate this problem ... and now cannot solve it.”

Letting Tepco remove the fuel rods is like [letting a convicted murderer perform delicate brain surgery on a VIP](#).

Top scientists and government officials say that [Tepco should be removed from all efforts](#) to stabilize Fukushima. An [international team of the smartest engineers and scientists](#) should handle this difficult “surgery”.

The stakes are high ...

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