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# Japan may have lost race to save nuclear reactor

Fukushima meltdown fears rise after radioactive core melts through vessel – but 'no danger of Chernobyl-style catastrophe'

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**Ian Sample**, science correspondent  
guardian.co.uk, Tuesday 29 March 2011 16.53 BST

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Highly radioactive water is now being detected outside the containment area at Fukushima, experts have warned. Photograph: Tepco/AFP/Getty Images

The radioactive core in a reactor at the crippled Fukushima nuclear power plant appears to have melted through the bottom of its containment vessel and on to a concrete floor, experts say, raising fears of a major release of radiation at the site.

The warning follows an analysis by a leading US expert of radiation levels at the plant. Readings from reactor two at the site have been made public by the Japanese authorities and Tepco, the utility that operates it.

Richard Lahey, who was head of safety research for boiling-water reactors at General Electric when the company installed the units at Fukushima, told the Guardian workers at the site appeared to have "lost the race" to save the reactor, but said there was no danger of a Chernobyl-style catastrophe.

Workers have been pumping water into three reactors at the stricken plant in a desperate bid to keep the fuel rods from melting down, but the fuel is at least partially exposed in all the reactors.

At least part of the molten core, which includes melted fuel rods and zirconium alloy cladding, seemed to have sunk through the steel "lower head" of the pressure vessel around reactor two, Lahey said.

"The indications we have, from the reactor to radiation readings and the materials they are seeing, suggest that the core has melted through the bottom of the pressure vessel in unit two, and at least some of it is down on the floor of the drywell," Lahey said. "I hope I am wrong, but that is certainly what the evidence is pointing towards."

The major concern when molten fuel breaches a containment vessel is that it reacts with the concrete floor of the drywell underneath, releasing radioactive gases into the surrounding area. At Fukushima, the drywell has been flooded with seawater, which will cool any molten fuel that escapes from the reactor and reduce the amount of radioactive gas released.

Lahey said: "It won't come out as one big glob; it'll come out like lava, and that is good because it's easier to cool."

The drywell is surrounded by a secondary steel-and-concrete structure designed to keep radioactive material from escaping into the environment. But an earlier hydrogen explosion at the reactor may have damaged this.

"The reason we are concerned is that they are detecting water outside the containment area that is highly radioactive and it can only have come from the reactor core," Lahey added. "It's not going to be anything like Chernobyl, where it went up with a big fire and steam explosion, but it's not going to be good news for the environment."

The radiation level at a pool of water in the turbine room of reactor two was measured recently at 1,000 millisieverts per hour. At that level, workers could remain in the area for just 15 minutes, under current exposure guidelines.

A less serious core meltdown happened at the Three Mile Island nuclear plant in Pennsylvania in 1979. During that incident, engineers managed to cool the molten fuel before it penetrated the steel pressure vessel. The task is a race against time, because as the fuel melts it forms a blob that becomes increasingly difficult to cool.

In the light of the Fukushima crisis, Lahey said all countries with nuclear power stations should have "Swat teams" of nuclear reactor safety experts on standby to give swift advice to the authorities in times of emergency, with international groups co-ordinated by the International Atomic Energy Authority.

The warning came as the Japanese authorities were being urged to give clearer advice to the public about the safety of food and drinking water contaminated with radioactive substances from Fukushima.

Robert Peter Gale, a US medical researcher who was brought in by Soviet authorities after the Chernobyl disaster, in 1986, has met Japanese cabinet ministers to discuss establishing an independent committee charged with taking radiation data from the site and translating it into clear public health advice.

"What is fundamentally disturbing the public is reports of drinking water one day being above some limit, and then a day or two later it's suddenly safe to drink. People don't know if the first instance was alarmist or whether the second one was untrue," said Gale.

"My recommendation is they should consider establishing a small commission to independently convert the data into comprehensible units of risk for the public so people know what they are dealing with and can take sensible decisions," he added.

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