

The Washington Post

[Back to previous page](#)



Covidien:
Improving
physical and
fiscal health.

[Learn more](#) ▶

 **COVIDIEN**
positive results for life

Japanese nuclear plants' operator scrambles to avert meltdowns

By Chico Harlan and Steven Mufson, Sunday, March 13, 3:30 PM

TOKYO — Japanese authorities said Sunday that efforts to restart the cooling system at one of the

[reactors damaged](#) by [Friday's earthquake](#) had failed, even as officials struggled to bring several other damaged reactors under control.

Workers at the Fukushima Daiichi nuclear plant have not found a way to stabilize overheated reactors and feared the possibility of partial nuclear meltdown, which could potentially cause a further release of radioactive material, Japan's top government spokesman said Sunday. Engineers were having trouble, in particular, with two units at the nuclear facility — one of which lost its outer containment wall Saturday in an explosion.

Meanwhile, officials declared a state of emergency at a nuclear power plant in Onagawa, where excessive radiation levels were reported.

Chief Cabinet Secretary Yukio Edano said a similar explosion could soon occur at Fukushima Daiichi's unit 3, the result of hydrogen levels that are increasing within the unit's reactor vessel amid last-ditch efforts to keep fuel rods submerged in water. Already, trace amounts of radioactive material have leaked from the No. 3 reactor, Edano said.

“At the risk of raising further public concern, we cannot rule out the possibility of an explosion,” Edano said.

But Edano also insisted that an explosion would have no impact on human health. Based on initial findings from the government and from Japan's nuclear agency, the Saturday explosion in unit 1 did not damage the reactor vessel, and the government said that the unit 3 reactor vessel would also withstand an explosion. The reactor vessels of No. 3 and No. 1 are being flooded with seawater and boron in an emergency attempt to keep the units cool after the plant lost its main power supply and a backup system failed.

Though the third unit is being filled with water, its gauge inside does not register the rising levels, Edano said. He did not have an explanation.

“If the cooling system is not maintained, there is a good chance the core could start melting down,” said Masahi Gota, a former Toshiba engineer who was involved in the design of the containment vessel for these nuclear reactors.

Richard Lester, co-chair of the Department of Nuclear Science and Engineering at MIT, said: “The most important task that the operators have — and have had for last 36 hours — is to keep the fuel in the reactor covered, submerged in water. If they succeed in doing that, keeping the fuel rods covered in water, the likelihood of significant damage to the fuel is low. If they cannot keep the fuel covered with water, then you have the possibility of melting.”

Some 170,000 people have been evacuated around a 12-mile radius of the plant. They join more than 450,000 other evacuees from other [quake- and tsunami-affected regions](#). A spokesman for Japan's nuclear agency said as many as 160 people may have been exposed to radiation and were being tested at a hospital to determine if levels were dangerous.

“Only the gravest danger would justify an evacuation at such a moment,” said Peter Bradford, a former commissioner at the U.S. Nuclear Regulatory Commission.

Edano said officials were acting on the assumption that a meltdown could be underway at Fukushima Daiichi's unit 3, and that it was “highly possible” a meltdown was underway at its unit 1 reactor, where

an explosion destroyed a building a day earlier.

Authorities made preparations to distribute potassium iodide pills and warned people in the vicinity to stay inside and cover their mouths if they ventured outdoors.

Tokyo Electric Power, owner of the two heavily damaged complexes, took the unprecedented step of pumping seawater mixed with boric acid into Fukushima Daiichi's unit 1 reactor to tame ultra-high temperatures from fuel rods that had been partially exposed. In keeping with the natural as well as mechanical challenges of the week, the company had to delay the plan briefly after another, more mild, earthquake rocked the area and led to another tsunami warning.

Tokyo Electric said it had also vented or planned to vent steam and gas containing small amounts of radioactivity from six of its other reactor units. One worker died after being trapped in an exhaust stack, the company said, and another was hospitalized for radiation exposure.

The explosion inside Fukushima Daiichi unit 1 destroyed a building that housed both the reactor vessel and its containment structure. It was caused by hydrogen, which nuclear experts said could only have been produced from inside the reactor vessel by the exposure of zirconium cladding that surrounds the fuel rods. Those rods are supposed to be covered by water, but at very high temperatures, steam reacts with the zirconium and produces hydrogen.

When pressure rose in the reactor vessel, it vented the gas into the containment structure and then into the outer building. Experts think devices designed to ignite the hydrogen before it reached dangerous levels were not working, because of power failures.

Those power failures helped start the crisis at the nuclear plants. After grid power was knocked out by the quake, the tsunami flooded and disabled backup diesel generators and battery power ran out. Margaret Harding, a U.S. nuclear-safety consultant in touch with experts in Japan, said the entire complex was blacked out for a period of time before new backup generators arrived.

Another indication that the fuel rods in Fukushima Daiichi unit 1 were exposed is that Japan's Nuclear and Industrial Safety Agency (NISA) said Saturday that the reactor could be nearing a meltdown and that two radioactive substances, cesium and radioactive iodine, had already been detected nearby.

The explosion also rattled public confidence, sparking a run on bottled water in Tokyo.

Japan has an ambivalent relationship with nuclear issues. As victim of the only wartime nuclear bombings, it opposes such weapons. But as a resource-scarce country, it has turned to nuclear power to help fuel its economy.

Japan's dependence on nuclear energy soared after 1973 in response to skyrocketing oil prices that year. In 2002, the country mapped a future that sought to decrease the country's greenhouse gas emissions by further increasing its reliance on nuclear power. Plans call for 50 percent of the country's electricity to come from nuclear plants by 2017, up from about 30 percent today. The country has 54 nuclear reactors.

Fukushima Daiichi unit 1 is one of the oldest operating nuclear plants in Japan, turning 40 years old on March 26. NISA, the country's regulatory authority for the sector, licenses reactors to operate for 40 years — meaning that unit 1 was scheduled to be taken offline this month. It is unclear whether NISA had planned to extend the reactor's license.

There are 23 reactors in the United States with the same design as Fukushima Daiichi unit 1.

Experts said the decision to pump seawater into the unit was a recognition that the elaborate system of valves, pumps and pipes, and the layers of steel and concrete, might not be enough to guarantee that the nuclear facility could avoid a disaster of Chernobyl proportions.

The water and boric acid would absorb neutrons, Tokyo Electric said. But experts said it would also make it unlikely that the plant would operate again.

“We’re past worrying about ruining the reactor,” said Victor Gilinsky, another former commissioner at the U.S. Nuclear Regulatory Commission. “It’s gone.”

Already, Tokyo Electric reported that radiation levels next to the unit 1 building had increased nearly a hundredfold.

The Nuclear Energy Institute said the incident at Fukushima Daiichi had been given a rating of 4 on its 7-point International Nuclear and Radiological Event Scale, lower than the 5 earned by the 1979 Three Mile Island incident in Pennsylvania and the 7 earned by the 1986 Chernobyl disaster.

But many experts said it was too early to reach conclusions while new information was emerging.

Meanwhile, Tokyo Electric was still trying to get control over reactors at the second complex, Fukushima Daini. A water condensate system used to supplement the cooling system at Fukushima Daini unit 1 stopped working when temperatures reached 100 degrees Celsius.

Tokyo Electric also announced that it would carry out controlled releases to ease pressure in the containments of all four units at Fukushima Daini.

Nuclear safety experts were seeking answers to other questions about Japan’s nuclear facilities that have been obscured by the focus on the Fukushima reactors. The nuclear plants also have spent fuel pools that some experts say may have spilled during the earthquake and its aftershocks. Tokyo Electric has not commented yet on those pools, which in the case of the General Electric-designed reactors are on the roof, possibly making them vulnerable.

Similar pools are found at other nuclear power plants around the country.

The U.S. government and private companies said they had offered assistance to Japan but had not received any requests. The Energy Department said it was “in close contact” with its Japanese counterparts and would “provide whatever assistance they request to help them bring the reactors under control.”

harlanc@washpost.com

mufsons@washpost.com

Harlan reported from Tokyo.

Sponsored Links

Refinance Rates at 2.8%

\$160,000 Mortgage \$659/mo. No Hidden Points/Fees. 3.1% apr. Get Quote!
LendGo.com/mortgage

Time for a Career Change?

View college programs that fit your lifestyle. Visit DegreePath.com today!
www.DegreePath.com

\$65/Hr Job - 25 Openings

Part-Time job (\$20-\$65/hr). Requirements: Home Internet Access
SpecialReport11.com/Money

[Buy a link here](#)

© 2011 The Washington Post Company