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Japan Races to Restart Reactors' Cooling System

By KEN BELSON, HIROKO TABUCHI and KEITH BRADSHER

*This article is by **Ken Belson, Hiroko Tabuchi and Keith Bradsher.***

TOKYO — Scrambling to corral a widening crisis, engineers linked a power cable to the crippled Fukushima Daiichi Nuclear Power Station early Saturday as they struggled to restart systems designed to prevent overheating and keep radiation from escaping.

The Tokyo Electric Power Company, which runs the plant, said it hoped to connect the electric cord to the cooling equipment inside the facility later Saturday in an attempt to stabilize the reactors that were damaged by the powerful earthquake and tsunami that struck [Japan](#) eight days ago.

In a brief statement on Japanese television Saturday morning, an official for Japan's Nuclear and Industrial Safety Agency said that workers had managed to restart a diesel pump and restored cooling functions at two of the reactors, Nos. 5 and 6, early Saturday morning. He did not provide any details.

Those reactors were not in use when the disaster occurred, but they contained spent fuel rods, and engineers were concerned this week when temperatures in the reactors began to rise.

About 150 of its people were working on the electrical cable, the power company said, and they were planning to start with Reactor No. 2, which on Friday was seen spewing steam, perhaps containing radioactive particles.

Officials have cautioned, however, that restoring electricity to the reactor would prove fruitless if the pumps were not working. In that case, a new cooling system would be needed, leading to more delays in an emergency that has bedeviled the power company and the government and caused anxiety and frustration overseas.

The nuclear safety agency said that the crisis now had wider consequences, and raised its assessment of the accident's severity to Level 5 on a seven-level scale established by the [International Atomic Energy Agency](#). Hidehiko Nishiyama, a senior official at the agency, said the assessment was retroactive to Tuesday and based on the fact that officials now assumed that more than 3 percent of the nuclear fuel at the plant had experienced meltdown.

The adjustment was an admission by Japanese officials that the problem was worse than it had previously stated. "We could have moved more quickly in collecting information and assessing the situation," said Yukio Edano, the chief cabinet secretary.

Outside experts have said for days that this disaster is worse than the one in 1979 at Three Mile Island — which the United States classified as a 5 on the international scale but which released far less radiation outside the plant than Fukushima Daiichi already has.

Engineers are starting the power cord effort with Reactor No. 2 because its outer building has not blown off, thus making it hard to spray in water the way they can with Nos. 1, 3 and 4, according to NHK, Japan's national broadcaster, which cited power company officials.

The plan was to lay a 1.5-kilometer power cable between Reactor Nos. 1 and 3 to get to No. 2. If they can hook it up, it will theoretically be able to power all six reactors. The main hazard was the exposure of workers.

Unable to contain the catastrophe on its own, Tokyo Electric has received help from Japanese police and fire departments and the country's Self-Defense Forces. Assistance has started to flood in as well, with nuclear experts arriving from the United States and international agencies. France and South Korea are also providing support.

Overnight in Japan, crews from the Tokyo Fire Department doused water on Reactor No. 3, which was doused earlier Friday by teams from the Self-Defense Forces and the United States military. Workers planned to continue the spraying on Saturday.

In a further sign of spreading alarm on Friday that uranium in the plant could begin to melt, Japan planned to import about 150 tons of boron from South Korea and France to mix with water to be sprayed onto damaged reactors, French and South Korean officials said Friday. Boron absorbs neutrons during a nuclear reaction and can be used in an effort to stop a meltdown if the zirconium cladding on uranium fuel rods is compromised.

Tokyo Electric Power said this week that there was a possibility of "recriticality," in which fission would resume if fuel rods melted and the uranium pellets slumped into a jumble on

the floor of a storage pool or reactor core. Spraying pure water on the uranium under these conditions can actually accelerate fission, said Robert Albrecht, a longtime nuclear engineer.

Nuclear reactions at the plant were halted immediately after last week's 9.0-magnitude earthquake and before the tsunami arrived minutes later.

In the past two days, Japanese officials have focused on cooling spent fuel rods in a storage pool in Reactor No. 3, but on Friday steam was seen rising from Reactor No. 2. It was one of two hit by an explosion on Tuesday.

Additionally, a senior Western nuclear industry executive said Friday that there appeared to be damage to the floor or sides of the spent fuel pool at Reactor No. 4, and that this was making it hard to refill the pool with water. The problem was first reported by The Los Angeles Times.

Engineers said Thursday that a rip in the stainless steel lining of the pool at Reactor No. 4 and the concrete base underneath it was possible as a result of earthquake damage. The steel gates at either end of the storage pool are also vulnerable to damage during an earthquake and could leak water if they no longer close tightly.

The senior executive, who asked not to be identified because his comments could damage business relationships, said that a leak had not been located but that engineers had concluded that it must exist because water sprayed on the storage pool had been disappearing much more quickly than would be consistent with evaporation.

Technicians focused Friday on fixing electrical connections at Reactor No. 2 and spraying more water on No. 3 while studying the problem at No. 4.

"They have to figure out what to do, and certainly you can't have No. 2 going haywire or No. 3 going haywire at the same time you're trying to figure out what to do with No. 4," said the executive, who said he had learned of the problem from industry contacts in Japan.

One concern at No. 4 has been a fire that was burning at its storage pool earlier in the week; American officials are not convinced the fire has gone out. American officials have also worried that the spent-fuel pool at that reactor has run dry, exposing the rods.

The new setbacks emerged as the first readings from American data collection flights over the plant in northeastern Japan showed that the worst contamination had not spread beyond the 19-mile range of highest concern established by the Japanese.

While the findings were reassuring in the short term, the United States declined to back away from its warning to Americans there to stay at least 50 miles from the plant, setting up a larger perimeter than the Japanese government had established. American officials did not release radiation readings.

Japanese officials, meanwhile, said Friday that despite their decision to elevate the level of severity, they were not expanding the evacuation zone.

The National Police Agency said Saturday that there were nearly 7,200 confirmed deaths so far, and nearly 11,000 people missing.

At the request of the Japanese military, a Massachusetts company, iRobot, said it put four robots on a plane for Japan on Friday. Colin Angle, the chief executive, said it had sent two small robots that could measure radiation levels close to the reactors and two larger ones that could pull hoses to spray water on the fuel rods.

He said Japanese soldiers could operate the robots from a protected vehicle.

Ken Belson and Hiroko Tabuchi reported from Tokyo, and Keith Bradsher from Hong Kong. Reporting was contributed by Mark McDonald and Kantaro Suzuki from Tokyo, David E. Sanger from Washington, William J. Broad and Christopher Drew from New York, Thom Shanker from Washington and Alan Cowell from Paris.