

# Japan's reactor shutdown to take at least six months

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The Tokyo Electric Power Company (TEPCO) announced on Sunday a two-stage plan to stabilise the four crippled reactors at its Fukushima Dai-ichi plant within six to nine months. More a list of optimistic objectives designed to placate a hostile public than a definite plan, the proposals confront major obstacles.

In a nationally-televised news conference, TEPCO chairman Tsunehisa Katsumata promised that the company would do its utmost to ensure that evacuees would return to their homes and “the Japanese people can live without worry.” He said TEPCO would take measures to reduce radiation leakage over the next three months, followed by steps to achieve the “cold shutdown” of the reactors in a further three to six months.

Four of the six units at the Fukushima plant were badly damaged after the March 11 earthquake and tsunami cut off power supplies from the grid and caused backup generators to fail. Without cooling systems, the reactor cores and spent fuel rod pools heated dangerously, causing an unknown amount of damage. TEPCO took ad hoc emergency measures to prevent a full-scale meltdown, including the use of salt water. A series of hydrogen explosions badly damaged the reactor buildings, equipment and instrumentation.

The temperatures in units 1, 2 and 3 are currently being controlled by the continuous pumping of water into their reactor cores. To establish “cold shutdown” means cooling the cores to less than 100 degrees centigrade at normal atmospheric pressure—that is, less than the boiling point of water. This presents serious problems, given the unknown state of the reactor cores and their normal cooling systems. The US Nuclear

Regulatory Commission (NRC), along with other nuclear experts, considers that the inner pressure vessel in at least one of the reactors has been breached, with nuclear fuel leaking into the outer containment vessel.

Before TEPCO can attempt to restart normal cooling systems, it has to pump some 60,000 tonnes of highly radioactive water out of the basements of turbine buildings as well as various service tunnels. The scope of the difficulties has been underscored by the efforts to prevent water leaking into the sea from a tunnel connected to reactor 2. Last week TEPCO pumped 660 tonnes of the water from the tunnel into the reactor's condenser, but the water level unexpectedly rose back to above its previous level by Friday.

On Saturday, Hidehiko Nishiyama, spokesman for Japan's Nuclear and Industrial Safety Agency (NISA), reported a spike in the levels of radioactivity in the seawater near the plant. The level of iodine-131 reached 6,500 times the legal limit, up from 1,100 times on the previous day. Levels of cesium-134 and cesium-137 increased nearly four-fold. While iodine-131 has a half life of 8 days, cesium-134 and cesium-137 have half lives of 2 and 30 years respectively. TEPCO has begun dumping zeolite and sand into the sea in a bid to absorb the cesium isotopes.

In a further indication of the dangers involved, TEPCO has been injecting nitrogen into reactor 1 to try to prevent a build-up of hydrogen and oxygen—and further explosions. The company now plans to inject nitrogen into reactors 2 and 3 as well.

One element of TEPCO's plan involves flooding the primary containment vessels of reactors 1 and 3 with

water. Water normally circulates within the reactor's pressure vessel, not the containment vessel, which is designed to prevent radiation leaking. In a confidential report last month, the American NRC warned that the weight of water in the containment vessel could render it prone to cracking, particularly in the event of a major aftershock. In the case of reactor 2, repairs to the containment vessel will have to be undertaken before it can be filled with water.

For the thousands of Fukushima residents who have been forced to leave the official exclusion zone around the plant, it will be months, possibly years, before they can return to their homes, farms and businesses. The *Financial Times* reported yesterday: "Government officials said evacuees would have to wait at least until the 'cold shutdown' to return to their homes, though experts say it could be years before residents of the worst contaminated areas can do so."

The government last week ordered TEPCO to make initial compensation payments to 50,000 families within 30 kilometres of the plant—most of whom have had to leave their homes. The payments of one million yen (about \$US12,000) for families and 750,000 yen (\$9,000) for individuals is a pittance for people who, in many cases, have nothing and are surviving in emergency shelters. TEPCO had previously made small handouts of 20 million yen each to 10 municipal governments in the affected areas.

The company raised 2 trillion yen in emergency loans last month. However, TEPCO president Masataka Shimizu told the media that most of the money would be needed to repair damaged facilities and buy extra natural gas and other fuel for alternative power plants to make up for the loss of its nuclear facilities.

Kazuko Suzuki told the Associated Press that she had fled her home without packing. She now had no job and her son had lost an offer of work. Commenting on the compensation payment, Suzuki said: "I feel like this is just a way to take care of this quickly." Another evacuee, Akemi Osumi, said her family had moved out of a shelter and rented an apartment so her eldest son could attend vocational school. "One million yen doesn't go very far," she said.

There is deep public suspicion and hostility toward TEPCO, which is notorious for its cover-ups and lack of transparency on safety issues. An article in the *Yomiuri Shimbun* yesterday highlighted the fact that the company had ignored warnings from experts that the Fukushima Dai-ichi plant could be vulnerable to a tsunami. The March 11 tsunami swamped all but one of the emergency generators at the plant, leading to a catastrophic power failure.

In June 2009, Yukinobu Okamura, director of the Active Fault and Earthquake Research Centre, criticised TEPCO's plan to revise its seismic-resistant designs at the Fukushima plant. "This plan doesn't even mention the major tsunami that has happened in the past. I'm not convinced at all," he told an expert panel convened by the Ministry for Economy, Trade and Industry (MITI).

Despite TEPCO's tarnished record, the government and its nuclear agencies have left it in charge of stabilising the Fukushima plant. Even if the company manages to achieve cold shutdown, it will be many years before the damaged reactors can be dismantled and the site and surrounding areas cleaned of radioactivity.

The *New York Times* reported on Saturday that two conglomerates—one led by Hitachi and the other by Toshiba—had prepared competing plans for the long-term rehabilitation of the site. Hitachi predicted that it would take at least three decades to complete the process, while its rival for the job claimed it could be done in as little as 10 years. The cleanup after the 1979 accident at the Three Mile Island plant in the US, which involved just one reactor, took 14 years and cost about \$1 billion.



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