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Radiation Exceeds Regulatory Levels at Japan Nuclear Plant

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(See EXT2 <GO> for more news on the earthquake.)

March 13 (Bloomberg) -- Radiation levels increased near the Fukushima nuclear power plant 135 miles north of Tokyo and cooling systems at a second reactor failed, intensifying concerns about a possible meltdown.

The radiation at the Fukushima Dai-Ichi plant exceeded Japanese limits after an explosion yesterday destroyed the walls of the reactor building and injured four workers following the magnitude-8.9 earthquake on March 11, said Naoyuki Matsumoto, a spokesman for Tokyo Electric Power Co., the operator of the plant. No damage to the building housing the reactor was reported, the company said.

Tokyo Electric is battling to prevent a meltdown of two reactors at the nuclear power station by flooding them with water and boric acid to eliminate the potential for a catastrophic release of radiation. The station lost power needed to keep the reactor core cool after the earthquake two days ago, the largest ever recorded in Japan.

Chief Cabinet Secretary Yukio Edano, Japan's top government spokesman, said today the radiation is not at a dangerous level.

Winds in the area of the Fukushima plant are blowing at less than 18 kilometers (11 miles) per hour generally in an easterly direction, according to a 12 p.m. update from the Japan Meteorological Agency.

Tokyo Electric began injecting sea water and boric acid to cool its Fukushima Dai-Ichi No. 1 reactor, according to a statement today. The plant's No. 3 reactor has been vented to release pressurized gas after its cooling system failed, said spokesman Akitsuka Kobayashi.

Success 'High'

The "likelihood of success should be fairly high," Dale Klein, a professor of nuclear engineering at the University of Texas at Austin and former chairman of the U.S. Nuclear Regulatory Commission, said of the seawater flooding. "This should have been part of their overall strategy to keep the core covered and cooled."



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Inadequate cooling of the reactor core may lead to a meltdown, the most dangerous kind of nuclear power accident because of the threat of radiation releases, according to the Nuclear Regulatory Commission. The 1979 partial meltdown at the Three Mile Island reactor in Pennsylvania failed to breach the containment building, according to the commission.

"Only a small amount of active particles made it outside and were released into the atmosphere, so there were no consequences for the population," Rafael Arutyunyan, first deputy director of Institute for Safety of Nuclear Energy at the Russian Academy of Sciences, said on Russian television over the weekend in reference to Three Mile Island. "That's the way we're heading at the moment" in Fukushima, he said.

Lost Power

The Fukushima complex lost power after the earthquake when its reactors shut automatically and a backup generator failed, making it difficult to circulate cooling water, Tokyo Electric has said. Without circulation, water within the reactor can boil away, exposing the hot fuel rods and starting a meltdown, Klein said. Three Mile Island operators exposed the core by mistake, the U.S. concluded.

"The difference here is that people understand what's happening," Klein said. "They are just having difficulty getting the equipment to work because of the very adverse conditions of both an earthquake and a tsunami."

The type of accident that involves the loss of both the electrical grid and backup power on site is known as a "station blackout," said Ken Bergeron, a physicist and former staff member at Sandia National Laboratories, where he worked on nuclear reactor accident simulation.

'Station Blackout'

"It's considered to be extremely unlikely, but the station blackout has been one of the great concerns for decades," he told reporters on a conference call. "We are in uncharted territory. We are in the land where probability says we shouldn't be and we are hoping that all of the barriers to release of radioactivity will not fail."

Radioactive cesium, a product of atomic fission, was detected near the site yesterday, indicating a meltdown may have begun, said Yuji Kakizaki, a spokesman for the Nuclear and Industrial Safety Agency.

"If the fuel rods are melting and this continues, a reactor meltdown is possible," Kakizaki said.

There are six reactors at the Dai-Ichi site. The unit being flooded, No. 1, is a General Electric Co. boiling-water reactor model that is capable of generating 439 megawatts of power and began commercial operation in 1971, according to the International Atomic Energy Agency.

If the seawater-flooding attempt fails, engineers may have to pump in sand and cement to entomb the reactor, Peter Bradford, another former member of the Nuclear Regulatory Commission, said on the press conference call.

Chernobyl Meltdown

That ended contamination from the 1986 Chernobyl accident in Ukraine, where the meltdown of a reactor without a containment building killed at least 28 workers, the United Nations Scientific Committee on the Effects of Atomic Radiation said in a 2011 report.

Thousands were evacuated in Japan as workers vented radioactive gas yesterday from the plant 220 kilometers (140 miles) north of Tokyo. The death toll from the quake and a tsunami that swept over the northern coastline after the quake topped 600 and an estimated 4,000 were stranded in evacuation centers.

Rain or Snow

Temperatures may fall bringing rain or snow to earthquake stricken northern Japan after tomorrow, with lows dropping to 1 degree Celsius (34 degrees Fahrenheit), according to Japan Meteorological Agency forecasts. Lows may fall below freezing later in the week, the agency said.

The reactor at the Fukushima Dai-Ichi plant may remain shut for a year, Seth Grae, chief executive officer of Lightbridge Corp., a nuclear energy consulting company whose staff previously inspected the plant, said in an interview with Pimm Fox on Bloomberg Television's "Taking Stock" on March 11.

"If they do lose several of those plants for a few months it could have a significant effect on Japan's economy," he said. "A trickle down could hit factories, slowing down Japan's production."

Japanese Reactors

Tokyo Electric took almost two years to restart power generation at the Kashiwazaki Kariwa nuclear plant in the country's northwest after a 6.8 magnitude temblor on July 16, 2007, caused a fire and radiation leaks at the world's biggest atomic energy station.

Nuclear energy provides almost 30 percent of Japan's electricity, with total capacity of about 47,000 megawatts, with plans to increase that to 40 percent by 2017, according to the World Nuclear Association. The nation's first reactor began operating in 1966 and there are 54 reactors in the country. A nuclear plant usually operates as many as 8 reactors.

A neighboring nuclear power station, Fukushima Dai-Ni, has four reactors. Tokyo Electric has also started preparing to vent gas from containment areas at that plant, Akitsuka Kobayashi, a company spokesman, said yesterday.

"When the pressure starts building up, the emergency procedure is to start venting," Dave Lochbaum, director of the nuclear safety project at the Union for Concerned Scientists, said in a telephone interview. "They've essentially entered a beat-the-clock game. As long as there is no fuel damage, there will be radioactivity, but it will be very low."

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