

Fukushima: TEPCO procrastinated even after tsunami threat shown

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In March 2002, Tokyo Electric Power Co. revised upward the height of potential tsunami and took precautionary measures at its nuclear plants. The new maximum height was 5.7 meters, and the company stuck with that scenario despite warnings and simulations showing that waves much higher could hit the coast of northeastern Japan.

And TEPCO's anti-tsunami measures, for 5.7-meter waves, were left untouched until March 11, when a tsunami up to 13 meters high swamped the Tohoku region and crippled the Fukushima No. 1 nuclear power plant, leading to multiple meltdowns.

"In retrospect, it is true that we were too late," Junichi Matsumoto, acting general manager of TEPCO's Nuclear Power and Plant Siting Division, said at a recent news conference. "We did not sense any pressure that we should promptly take up the matter."

The government's Investigation Committee on the Accident at the Fukushima Nuclear Power Stations plans to investigate TEPCO's failure in this matter.

TEPCO's official tsunami height prediction was set at 3.1 meters when the Fukushima No. 1 nuclear plant was built in the early 1970s. But it was upgraded to the current 5.7 meters after the Japan Society of Civil Engineers (JSCE) in February 2002 established a method to evaluate tsunami heights using up-to-date simulation techniques based on a source fault model.

TEPCO's calculations were based on source models presented by the JSCE by way of illustration. Yet they were limited to areas where tsunami occurred in the past. No model was available for the "gap" beneath the seabed close to the Japan Trench, or far off the Fukushima Prefecture coast, where no tsunami was known to have originated.

However, the government's Headquarters for Earthquake Research Promotion said in July 2002 that tsunami could originate close to the trench anywhere between the Sanriku coast of the Tohoku region and the Boso Peninsula in Chiba Prefecture. This included a potential tsunami originating below the seabed off Fukushima Prefecture.

But TEPCO took virtually no action.

Incorporating the ideas of the earthquake research headquarters into a tsunami model involved the major challenge of dealing with uncertainties in the properties of the tsunami, including its source size.

Only in 2008 did TEPCO simulate a tsunami originating close to the trench off Fukushima Prefecture.

When the source of the Meiji Sanriku-oki event of 1896 and the source of the Boso-oki event of 1677 were relocated to the gap off Fukushima Prefecture, the simulations produced tsunami heights of 15.7 and 13.6 meters, respectively.

But TEPCO argued that these results included assumptions because the scenarios were not actually based on an event in the target location. It decided not to revise its official tsunami height prediction, although the simulated heights far exceeded 5.7 meters in both cases.

TEPCO management was also informed of the simulation results, but it merely said it would “prepare” or consider potential improvements on waterproof designs for reactor buildings and pumping equipment.

The simulation results were presented to the Nuclear and Industrial Safety Agency (NISA) on March 7, four days before the Great East Japan Earthquake triggered the deadly tsunami. Documents submitted by TEPCO on that occasion, which were disclosed in October, stated that measures were still “under consideration” and that the official tsunami height prediction would be revised “at an appropriate time.” The target date for the revisions was October 2012.

A NISA panel in 2009 advised TEPCO to consider the results of simulations that gave heights of up to 9.2 meters for the tsunami spawned by the Jogan earthquake in 869. But TEPCO did not take action, saying the ancient event was full of uncertainties.

In 2009-10, TEPCO studied geological formations in Fukushima Prefecture. The utility told a scientific conference in spring this year that a tsunami would likely not have exceeded 4-5 meters above sea level because evidence of past tsunami showed no waves above that height.

TEPCO had planned to present a tsunami source model that would account for that height at a scientific meeting this autumn.

On March 11, the Fukushima No. 1 nuclear plant was swamped by a tsunami “beyond imagination,” in TEPCO’s words. It soared to an estimated height of 13 meters along the coast and 11.5 to 15.5 meters on land. The waves damaged pumps at a height of 4 meters, flooded 10-meter-high areas that were supposed to be safe from water, and flooded the reactor building basements that housed emergency power generators and switchboards.

The central government’s anti-seismic guidelines, revised in 2006, called for preparedness for earthquakes and tsunami that are “very rare but have a chance of taking place.” It called on power companies to take into consideration any active fault that had slipped at least once during the past 120,000-130,000 years.

The Headquarters for Earthquake Research Promotion in 2002 estimated that tsunami are generated from beneath the seabed close to the Japan Trench once every 530 years. A research institution had also pointed out the risk, albeit low, of a serious accident caused by a major tsunami from that area.

When the Niigata Chuetsu-oki Earthquake damaged TEPCO’s Kashiwazaki-Kariwa nuclear plant in 2007, the utility spent 100 billion yen (\$1.3 billion) to reinforce the facility against earthquakes. The plant passed NISA’s screening based on the revised guidelines, including tsunami preparedness, and was given the green light to resume operations. TEPCO, however, failed to submit to NISA a reassessment of its tsunami preparations at the Fukushima No. 1 nuclear plant based on the new guidelines.

In August, NISA’s screening experts finally learned about the simulation results through news reports.

A NISA official said the simulation results should have been made available for open assessment by experts. TEPCO, however, argued that the results lacked enough scientific backing to justify open

discussions.

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