



Fukushima: Mark 1 Nuclear Reactor Design Caused GE Scientist To Quit In Protest

Damaged Japanese Nuclear Plant Has Five Mark 1 Reactors

By MATTHEW MOSK

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Thirty-five years ago, Dale G. Bridenbaugh and two of his colleagues at General Electric resigned from their jobs after becoming increasingly convinced that the nuclear reactor design they were reviewing -- the Mark 1 -- was so flawed it could lead to a devastating accident.

Questions persisted for decades about the ability of the Mark 1 to handle the immense pressures that would result if the reactor lost cooling power, and today that design is being put to the ultimate test in Japan. Five of the six reactors at the Fukushima Daiichi plant, which has been wracked since Friday's earthquake with explosions and radiation leaks, are Mark 1s.

"The problems we identified in 1975 were that, in doing the design of the containment, they did not take into account the dynamic loads that could be experienced with a loss of coolant," Bridenbaugh told ABC News in an interview. "The impact loads the containment would receive by this very rapid release of energy could tear the containment apart and create an uncontrolled release."

The situation on the ground at the Fukushima Daiichi plant is so fluid, and the details of what is unfolding are so murky, that it may be days or even weeks before anyone knows how the Mark 1 containment system performed in the face of a devastating combination of natural disasters.

But the ability of the containment to withstand the events that have cascaded from what nuclear experts call a "station blackout" -- where the loss of power has crippled the reactor's cooling system -- will be a crucial question as policy makers re-examine the safety issues that surround nuclear power, and specifically the continued use of what is now one of the oldest types of nuclear reactors still operating.

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GE told ABC News the reactors have "a proven track record of performing reliably and safely for more than

40 years" and "performed as designed," even after the shock of a 9.0 earthquake.

Still, concerns about the Mark 1 design have resurfaced occasionally in the years since Bridenbaugh came forward. In 1986, for instance, Harold Denton, then the director of NRC's Office of Nuclear Reactor Regulation, spoke critically about the design during an industry conference.

"I don't have the same warm feeling about GE containment that I do about the larger dry containments," he said, according to a report at the time that was referenced Tuesday in The Washington Post.

"There is a wide spectrum of ability to cope with severe accidents at GE plants," Denton said. "And I urge you to think seriously about the ability to cope with such an event if it occurred at your plant."

Bridenbaugh Believes Design Flaws Were Addressed At Fukushima Plant

Bridenbaugh told ABC News that he believes the design flaws that prompted his resignation from GE were eventually addressed at the Fukushima Daiichi plant. Bridenbaugh said GE agreed to a series of retrofits at Mark 1 reactors around the globe. He

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compared the retooling to the bolstering of highway bridges in California to better withstand earthquakes.

"Like with seismic refitting, they went back and re-analyzed the loads the structures might receive and beefed up the ability of the containment to handle greater loads," he said.

When asked if that was sufficient, he paused. "What I would say is, the Mark 1 is still a little more susceptible to an accident that would result in a loss of containment."

ABC News asked GE for more detail about how the company responded to critiques of its Mark 1 design. GE spokesman Michael Tetuan said in an email that, over the past 40 years, the company has made several modifications to its Mark 1 reactors in the U.S., including installing "quenchers" and fortifying the steel structures "to accommodate the loads that were generated." He said that GE's responses to modifications ordered by the Nuclear Regulatory Commission were also shared with the Japanese nuclear industry.

Bridenbaugh told ABC News that he is watching the events in Japan with a mix of anxiety and deep reflection. Many years have passed since he and fellow GE colleagues Gregory C Minor and Richard B. Hubbard publicly resigned, joined the anti-nuclear movement, and became known as the "GE Three."



Undoubtedly, he said, the containment structures at that Fukushima Daiichi plant are facing significant amounts of pressure -- and testing the very questions he was studying on paper more than three decades earlier. While he knew then that the Mark 1 had design limits, he said, no one knows now whether those limits will be surpassed.

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