

The Nuclear Regulatory Commission releases a tsunami assessment of Diablo Canyon 11 years later

Colin Rigley, San Luis Obispo New Times, 11-20-14

After more than 11 years, a 63-page report focused on the tsunami hazard at the Diablo Canyon nuclear power plant has been made public.

On Nov. 6, the Nuclear Regulatory Commission (NRC) released Dr. Robert Sewell's report, "A Preliminary Numerical Study of the Hazard from Local Landslide Tsunami Scenarios at the Diablo Canyon Site in Central California" (pdf). Released in response to a Freedom of Information Act request by San Luis Obispo Mothers for Peace attorney Diane Curran, the report was previously considered pre-decisional and exempt from public disclosure.

NRC Commissioner Kristine Svinicki was the sole dissenting vote when commissioners were asked whether to change the status quo and release the document in full. On Nov. 4, Svinicki wrote that the commission's 2006 decision to not release Sewell's findings was "understandable," and she disagreed with any change in policy based mostly on the amount of time that has passed.

When *New Times* reached out to Sewell with questions about the report, he said in an email "my report stands on its own, and I am confident that those who carefully review it will find it to be appropriate and valid."

The report was first drafted as part of an analysis of spent fuel storage containers at Diablo Canyon. The proposed site for those containers was given a go-ahead from the NRC, and they have since been installed. But Sewell found other potential vulnerabilities based on certain landslide scenarios that he concluded could create waves large enough to impact vital components. At the time, however, his conclusions were dismissed. In a 2004 letter to the NRC, John Stamatakos, a principal research scientist for Southwest Research Institute, said of Sewell's report: "As a geologist and seismologist, my technical opinion is that the methodology is beyond state of the art, the uncertainties too large, and the results too speculative to be considered in current licensing decisions."

According to Sewell's report, in which he modeled 13 potential landslide scenarios, the subsequent waves could reach far beyond what the plant was licensed to withstand. A typical design basis for a power plant looks at timeframes between 5,000 and 10,000 years, Sewell wrote, but he considered events that might occur every 750 years at a minimum, and as infrequently as every 500,000 years (his report further notes that the timelines are estimates that could vary by one to two orders of magnitude).

Existing tsunami hazard evaluations for Diablo Canyon place the largest potential wave in the region 32 feet above sea level, Pacific Gas & Electric (PG&E) Spokesman Blair Jones told *New Times* in a previous interview. Diablo Canyon's turbines, reactors, back-up electrical sources, and other safety systems are 85 feet above sea level, while even the seawater intake structure is designed for a 45.5-foot wave, Jones said.

Sewell's scenarios, however, produced waves that go beyond Diablo Canyon's design basis in all but one scenario. And if "combined effects of tsunami, tide, storm surge, and winds are considered," he wrote, then all 13 would exceed the design basis. In fact, all 13 scenarios produced wave heights that could impact the seawater intake (the auxiliary saltwater, or ASW), and all but two scenarios could lead to a "wave draw-down that would cause problems for ASW intake."

However, the scenarios were based on unlikely events and utilized limited data about the sea floor, which was the only data available. Still, Sewell wrote, “the analysis is believed to be suitable to draw the conclusions and recommendations documented subsequently.”

“At this point in time, the landslide tsunami threat for offshore central California has not yet been well studied, nor does it yet appear to be well understood,” he wrote later in the report.

Sewell acknowledged that his scenarios weren’t meant to provide a definitive picture of the local landslide tsunami hazard. And he outlined six recommendations that called for further study. Specifically, he asked to arrange a meeting and discuss the study, prepare preliminary regulatory guidance on evaluation and review for tsunami hazard assessment, perform preliminary tsunami hazard assessments and review the tsunami design bases from a sample of coastal nuclear power plants, sponsor tsunami hazard workshops, and develop a regulatory program for site screening and safety evaluation if further action is necessary. His last recommendation was that regulators request PG&E “to justify and/or re-evaluate the tsunami design bases and perform a state-of-the-art assessment of tsunami hazard and risk ... within the umbrella of its existing long-term seismic program.”

“Although in the past 12 years or so (since the time the report was prepared) there have been advances in tsunami science and data development, the general approach and methodologies employed in the report are still valid and appropriate,” Sewell said in an email statement to *New Times*. “Furthermore, the conclusions and recommendations of the report remain applicable today. I believe that suitable review (of the report and the context of its development) by the relevant stakeholders and by scientists, engineers, and decision makers who deal with matters of nuclear safety will confirm this position.”

New Times forwarded the study to the University of Southern California Tsunami Research Center, which, among other things, helped create the Tsunami Inundation Maps utilized by the California Department of Conservation to help local jurisdictions create coastal evacuation plans.

“The numbers are not that inconsistent, particularly in the low end, from the ones that we’re finding,” the center’s director, Costas Synolakis, said about Sewell’s report.

Though Synolakis noted that Sewell’s report draws conclusions from extreme events, he said the results should have prompted further study. He added that arguments against the report, namely that Sewell relied on low-resolution models, don’t necessarily negate the results and should also have led to more analysis.

In fact, a 2003 article in the *Bulletin of the Seismological Society of America* concluded that a magnitude 7.4 earthquake in Alaska in 1946 (the Aleutian earthquake) generated a landslide tsunami that ran as high as 42 meters (about 138 feet) above tide level, destroying a lighthouse.

“How can you dismiss a report that tells you that landslide tsunamis are a problem?” Synolakis said. “You can’t—even if your power plant is 80 feet high.”

According to the NRC, however, they didn’t dismiss the report and have conducted multiple studies of tsunami hazards at Diablo Canyon in the years since. On Oct. 10, NRC Executive Director for Operations Mark Satorius released a memo, which explained why the NRC didn’t release Sewell’s report at the time.

“The NRC staff assessed the concerns identified in the draft report and concluded that the preliminary nature of the study precluded its use as a basis for any regulatory decisions,” Satorius wrote.

He included a timeline of tsunami studies conducted by the NRC, including a 2007 tsunami research

program, a 2008 joint NRC and U.S. Geological Survey tsunami evaluation along the Atlantic and Gulf of Mexico coasts, multiple workshops between 2009 and 2011, and a 2013 staff guidance that outlined acceptable methods for performing a tsunami, surge, or seiche hazard assessment.

Jones previously told *New Times* Diablo Canyon has been rigorously studied as part of a wider post-Fukushima response.

“At Diablo Canyon, PG&E has taken many steps to further safety at the plant site and to prepare for the unexpected, including extreme events that could challenge the plant’s design,” Jones said.