NUCLEAR CRISIS
JAPAN & THE FUTURE OF ENERGY POLICY

## 3. NUCLEAR CRISIS: Could Calif. reactors be next? *(Greenwire, 03/15/2011)*

**Colin Sullivan, E&E reporter**

SAN FRANCISCO -- California's coast and its nuclear power plants are unlikely to experience the kind of massive offshore earthquake or sustained tsunami that rocked Japan last week, but more local tsunamis from submarine landslides are possible, according to experts who study West Coast tectonics.

The two nuclear plants on the California coast operate near population centers near the Pacific Ocean. Pacific Gas and Electric Co.'s Diablo Canyon facility is close to San Luis Obispo, and Southern California Edison Co.'s San Onofre plant is just south of Los Angeles.

The generating stations, in operation since the mid-1980s, are built to withstand earthquakes of 7.0-7.5 magnitude, and both have tsunami walls that are 25 to 30 feet tall. But the plants are more threatened by onshore faults than offshore, with Diablo Canyon especially vulnerable given its proximity to the San Andreas Fault.

Costas Synolakis, director of the Tsunami Research Center at the University of Southern California, said the offshore earthquake zone close to either plant is not capable of producing the 8.9 magnitude quake that devastated Northeast Japan last week. Regions farther north, from the California line to British Columbia, are in much greater danger for that sort of event, he said.

Those areas are near what is called the Cascadia Subduction Zone, which is capable of producing the kind of tsunami that inundated Japan and leveled everything in its path. The zone last ruptured around 1700, so, in theory, a big quake is possible anytime.

"The Cascadia Subduction Zone ... is the only offshore earthquake zone [on the West Coast] capable of producing megathrust events, i.e., very large 'top 10' type earthquakes," said Synolakis, adding that Seattle is in far more danger than any spot south of the California-Oregon line for that kind of quake plus tsunami.

"The impact to Seattle could be devastating," he said.

The Cascadia zone is capable of a 9.2 quake, which "could happen any time," Synolakis said. Offshore faults close to either nuclear power installation in California are not likely to top 7.5.

Even so, threats from the Earth's volatile geology in Southern California are plentiful.

Onshore earthquakes are always a danger, and there is a chance submarine avalanches (also called landslides) triggered by quakes could produce local tsunami events that wash into either of the two California plants, both of which will soon have to be relicensed if they are to continue pumping out electricity.

Synolakis said submarine landslides "can generate a fairly large tsunami," though this sort of wave would not travel across the ocean. Such events are not usually considered during safety proceedings because they are so rare.

"These things can be fairly devastating, locally," said Synolakis, estimating that the maximum run-up onshore would be about 45 feet in the southern part of the state.

### 'The real Earth is not perfect'

Mark Legg, an offshore fault expert and geophysicist with Legg Geophysical in Huntington Beach, Calif., agreed that the Cascadia zone is the real threat for a coastal quake/tsunami event that might rival Japan's.

The last time something of that magnitude occurred off the California coast was more than 30 million years ago, Legg said, explaining that the North American plate is no longer "being shoved" (or subducted) under the continental margin offshore, as a plate was in Japan last week.

Legg noted that the largest local tsunami off California was caused by a quake in 1927 in Point Arguello, which produced waves of about 7 feet. But he was also hesitant to rule anything out, because even offshore quakes that would tend to move more horizontally -- as they would off the California coast -- can "slip sideways" and produce walls of water.

"The real Earth is not perfect," said Legg, explaining that California has a number of spots called transverses, one right off the coast of Santa Barbara, that could result in tsunamis if the sea floor ruptures at the right angle.

"Those are areas that could see tsunamis generated even in a strike-slip system," he said. "This is a problem which is still being sorted out in the scientific community."

Legg noted that the Bay Area's Loma Prieta quake, in 1989, whose epicenter was in the Santa Cruz Mountains south of San Francisco, led to a tsunami caused by the uplift of the thrust movement so close to the ocean. The area of the uplift extended offshore, creating a tsunami.

"It wasn't very big, so it didn't do much damage," Legg said. "But if the landslide were bigger, it could be a lot worse."

A "very large submarine landslide" documented from about 7,500 years ago created coastal waves in the 20- to 50-foot range, Legg said, calling an event of that magnitude a "worst-case" scenario.

It is those kinds of scenarios that have led some academics to question where we build nuclear capacity. Chris Goldfinger, director of the Active Tectonics and Seafloor Mapping Laboratory at Oregon State University, said the recent events in Japan could signal a need to revisit whether any society should build such plants next to fault zones.

"Building critical facilities on active faults is an inherently dangerous practice and should only be done when all scenarios are very well accounted for, as they were not in Japan, even though the Japanese take great care with safety issues," Goldfinger said.

## Diablo Canyon relicensing

For PG&E, the Japan quake comes just as the Nuclear Regulatory Commission is reviewing its application to relicense the 2,240-megawatt plant, to keep it operational through 2045. Edison is also expected to file for a new license, for San Onofre, which is about 2,200 megawatts in size.

The question of new seismic studies for both appears likely to dog the entire relicensing process, which tends to take about four years to complete. PG&E has already found itself in the crosshairs for claiming, in testimony submitted to the California Energy Commission in October 2008, that "there is no uncertainty regarding the seismic setting and hazard at the Diablo Canyon site."

A letter sent last month from 10 California lawmakers to the Blue Ribbon Commission on America's Nuclear Future noted that weeks later, in November 2008, the U.S. Geological Survey discovered a new offshore fault close the plant, making it the second active fault in the area.

"An intersection of the faults could significantly alter previously held assumptions about potential seismic activity and threat to Diablo Canyon," the lawmakers wrote, asking for a hearing before the Blue Ribbon Commission.

The utility is also trying to recover funds from ratepayers for the relicensing to the tune of $85 million. That process is under way at the California Public Utilities Commission. PG&E did not return calls seeking comment.