

# Quake, tsunami at San Onofre? Science calms some fears, possibly stokes others

Teri Sforza, Orange County Register, 2-16-17

Those folds and faults in the ocean floor near San Onofre, where millions of pounds of nuclear waste may be entombed for decades?

New scholarship from Scripps Institution of Oceanography at UC San Diego finds evidence to put some fears to rest, and perhaps rekindle others.

Updated seismic studies for nuclear reactors like San Onofre were required even before Japan's Fukushima disaster, and as operator Southern California Edison was eyeing a 20-year license extension. That was cut short when design errors in San Onofre's new \$671 million steam generators caused tubes to wear and break, dooming the plant to an early demise. It was shuttered in 2013 and will be torn down over the next several decades at a cost of \$4.4 billion.

The new seismic science will be on the agenda tonight at the San Onofre Nuclear Generating Station's Community Engagement Panel meeting in Dana Point. The volunteer group – advising Edison on the decommissioning process – will hear from Neal Driscoll, the professor of geosciences at Scripps who conducted seismic probes, as well as from the general contractor hired in December to oversee the dismantling.

Staffed information booths open at 4:30 p.m. and the action runs 5:30-8:30 at the Ocean Institute, 24200 Dana Point Harbor Drive. There will be a public comment period, and the meeting will be live-streamed at [songscommunity.com](http://songscommunity.com).

These meetings are often the scene of fireworks as activists and officials face off, and tonight's meeting promises some drama.

## MAPPING THE FAULT

“Could an underwater landslide make a huge tsunami at SONGS?” – the San Onofre Nuclear Generating Station – asked environmental group San Clemente Green.

The answer: probably not, but maybe.

The researchers used two models to explain the deformation off California's southern coast, Driscoll said. One hypothesized an ocean-side blind-thrust fault, while the other hypothesized a segmented strike-slip fault.

Researchers spent 100 days at sea gathering data. They reprocessed old data with new supercomputers and new approaches. “We were able to map the fault structures offshore to an unprecedented scale, and there is no geophysical or geological evidence for an ocean-side blind thrust,” Driscoll said.

Their mapping of the Newport-Inglewood-Rose Canyon fault, however, raises more questions. This fault runs offshore from Newport Beach to La Jolla and is broken into four segments separated by “step overs” that are not large enough to inhibit a fracture along its entire length.

“Theoretically, the Newport-Inglewood-Rose Canyon fault could rupture end to end, from La Jolla up to Newport Beach, with a maximum earthquake of 7.3. That’s a pretty good-sized earthquake.”

San Onofre was designed to withstand a magnitude 7 quake five miles away – or peak ground acceleration of 0.67 Gs (as in, G-forces). That, however, will be moot once the domes are torn down. The dry storage systems that will remain on-site for many years are more than twice as robust, designed to withstand peak ground acceleration of 1.5 Gs, officials said.

The data show that for the past 10,000 to 13,000 years, the offshore segments have never ruptured simultaneously. But theoretically, it’s possible, Driscoll said.

The Newport section ruptured in 1933 with a 6.4 earthquake. The southern section, in La Jolla, ruptured about 1650, give or take a few hundred years. The central segments off San Onofre haven’t ruptured in those 10,000 to 13,000 years.

“It appears the fault is more active to the south and north, and hasn’t connected end to end, but we have to consider the possibility,” Driscoll said.

Tsunami risk – a major concern post-Fukushima – is parsed as well.

Offshore Southern California is a complex series of underwater mountains and valleys, and when far-field tsunamis approach the shore, energy builds up over the shoals and collapses in the valleys, Driscoll said.

These formations act as a natural baffle, blunting the energy. The offshore geophysical and geological evidence shows no large underwater failures that triggered a near-field tsunami – but that doesn’t mean it can’t happen in the future, he said.

About \$11 million has been spent on the seismic studies, said Maureen Brown, spokeswoman for Edison.

“Segmentation and Steppovers” was funded by the National Science Foundation, and Edison via a PUC grant; “Continental shelf morphology” was funded by the National Science Foundation’s Graduate Research Fellowship, with support for data acquisition and processing provided by Edison.

Headrick, of San Clemente Green, has great faith in Driscoll’s scientific credentials. But Driscoll reviewed studies concluding that DiabloCanyon is safe from earthquake threats, which gives Headrick pause. He is eager to hear what Driscoll has to say tonight.

“With two very long faults connecting on the edge of an underwater shelf that is 700 feet tall and 25 miles long, it seems more likely than not that a slide of some kind will occur,” Headrick said. “It will be interesting to see if Neal leans towards playing it down or not. If he does minimize the threat, I’ll have to wonder about the influence Edison has from providing the grant for the study.”

Driscoll’s presentation will last about one hour.

## **TEARDOWN UPDATE**

Also on hand will be officials from the general contractor chosen by Edison to oversee the dismantling, SONGS Decommissioning Solutions. It’s a joint venture of Los Angeles-based AECOM and alt Lake City-based

EnergySolutions. They'll provide an overview of the work scheduled to begin next year. Their job is to safely return most of the bluff overlooking the Pacific Ocean to its original state – one of the nation's largest commercial nuclear plant decommissioning projects.

Those iconic twin domes are made of concrete that's 4 feet thick and reinforced with steel and rebar. Dismantling them – and everything else, except the dry storage bunkers that will house spent nuclear fuel – will create about 600 jobs, including workers from local companies, Edison said.

But the main concern of activists and officials is not what will go, but what will stay. They urgently want to remove millions of pounds of spent nuclear waste that will be entombed in concrete close to the beach.

The worst place to store that waste is in a populated area, prone to earthquakes, beside the ocean, said Rep. Darrell Issa, R-Vista, on a visit to San Onofre last week. Almost anyplace would be better than where they are, he said.

About 8 million people live within 50 miles of the shuttered reactors, which generated radioactive waste for some 40 years. The federal government is contractually required to dispose of that waste, but has been paralyzed.

There is optimism that a newly-united federal government might make progress. Issa and colleagues introduced the Interim Consolidated Storage Act of 2017 in the House in January. It would allow the Department of Energy to use interest from the \$36 billion Nuclear Waste Fund to contract with private vendors for temporary storage. Waste could start moving away from the likes of San Onofre in as little as five years.