



ALLIANCE FOR NUCLEAR RESPONSIBILITY

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October 24, 2012

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For Immediate Release

ALLIANCE FOR NUCLEAR RESPONSIBILITY (A4NR) position paper and review of:
“Confirmatory Analysis of Seismic Hazard at the Diablo Canyon Power Plant from the Shoreline Fault Zone,” Research Information Letter, US Nuclear Regulatory Commission, September 2012
With implications and concerns regarding seismic studies at Diablo Canyon Nuclear Plant

On October 16, 2012, the US NRC released the above captioned report, along with the press release headlined, “Additional NRC analysis confirms earthquake safety at Diablo Canyon Nuclear Power Plant.” Detailed analysis of their report by A4NR reveals the NRC headlines to be disingenuous and misleading, rife with unsupported conclusions and based on less-than-current research. The full A4NR evaluation follows. Key points of contention are:

- PG&E is about to undertake \$64 million or more in a three-year, advanced, 3-D onshore and offshore seismic study. The NRC, rather than await the results of this undertaking, is prepared to “confirm” earthquake safety based on existing and possibly outmoded data.
- NRC miscalculates in refusing to investigate “multi-fault” rupture scenarios on the Shoreline and Hosgri faults. Multi-fault ruptures were the cause of the March 2011 Tohoku quake and subsequent Fukushima nuclear disaster, and represent current state-of-the art seismic theory.
- The NRC is prepared to accept a “Level 3” Senior Seismic Hazard Analysis Committee review of Diablo Canyon, rather than the highest “Level 4” review, without justification.
- The proposed research vessel chosen by PG&E to conduct the maritime work is cited for numerous technical failures and shortcomings by its own internal review committee.
- Failure of NRC to use due diligence in making its pronouncements regarding offshore seismic faults and hazards should give impetus to state regulators in assuring the ratepaying public that the studies are adequately scoped, executed and analyzed by independent peer reviewers.
- Given the doubts cast upon the NRC’s scientific rigor and assertions of safety as well as the potential marine impacts from the testing, A4NR maintains that these studies must be done—but done only once, and done right.

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Nearly two years ago, state senator Sam Blakeslee, PhD, told a seismic workshop in San Luis Obispo that he expected the Nuclear Regulatory Commission (NRC) to do more than simply “check the boxes” in a cursory manner when confirming earthquake safety at Diablo Canyon. On October 16, 2012, the NRC delivered a report that, regrettably, confirm those misgivings.

Accompanying the new report, an NRC press release trumpets: “ADDITIONAL NRC ANALYSIS CONFIRMS EARTHQUAKE SAFETY AT DIABLO CANYON NUCLEAR POWER PLANT.” However, further exploration into both the 5 page cover letter and 177 page report (<http://a4nr.org/?p=2394>) reveal troubling lapses and omissions that raise doubts about the thoroughness and timing of the review.

First and foremost, the NRC makes their assertions using old data, for none of the data from the yet-to-be undertaken, advanced 3-D offshore seismic studies has even been acquired. For example, buried 35 pages into the report, such “faulty” assertions rupture to the surface:

However, several other important aspects of the Shoreline fault remain poorly characterized and therefore subject to uncertainty.

These uncertainties include (1) the surface or subsurface rupture length of the fault, (2) structural relationships of the Shoreline fault to other faults, in particular the faults of the San Luis Bay fault zone, and (3) whether the Shoreline fault is capable of producing large enough earthquakes to affect the hazard at the DCP. [emphasis added]

Indeed, it was to address these uncertainties that the California Legislature passed AB 1632 to assess the cost/risks/benefits of ongoing reliance on nuclear power, and the California Energy Commission’s subsequent report recommended—among other concerns—updating the seismic understanding at the Diablo Canyon site. In the months following the devastating earthquake and meltdown at the Fukushima nuclear plants, the California legislature reiterated their desire to update our understanding. The NRC, rather than identifying the looming uncertainties and explaining the various post-Fukushima studies and requirements yet to come, instead provides a rubber stamp for PG&E’s hubris in asserting that there are no troubling “uncertainties.”

In a disingenuous twist on the scientific method, the NRC dismisses *a priori* the possibility of multi-fault rupture scenario:

The NRC did not consider a scenario in which an earthquake on the Shoreline fault continues to rupture onto the Hosgri fault. Large earthquakes from simultaneous rupture on the two faults (i.e., those greater than M7) would produce large surface displacement, which are not evident in the geologic record. The NRC concludes that the lack of significant horizontal displacement across the Shoreline fault rules out the possibility of joint rupture. [page 35]

If the Shoreline and the Hosgri are in fact linked, as most geologists believe, it makes no sense to isolate analysis to a single-fault scenario. The March 2011 great Tohoku event involved four separate faults or fault segments, and multi-fault theory is now considered the state-of-the-art in explaining major ruptures.

Additionally, one requirement for this latest NRC report was that PG&E provide an expanded analysis of the Shoreline fault. Not simply in comparison to the larger Hosgri fault (which was discovered *after* the plant was licensed and provided the standard to which the plant was subsequently retrofitted) but to the original Double Design Earthquake (DDE) and Safe Shutdown (SSE) earthquakes identified in the 1960s license. One of these earlier criteria postulated a M6.5 earthquake centered 6 miles beneath the plant. There is no evidence that PG&E ever provided this analysis to the NRC prior to the NRC's issuance of this new report, in spite of a request by the Alliance for Nuclear Responsibility to the NRC's new chairman, Allison Macfarlane, a geologist by profession (<http://a4nr.org/?p=227>)

More to the point, on page 4 of the cover letter that accompanied the NRC report:

The NRC recognizes that **using the DDE as the basis of comparison will most likely result in the Shoreline fault and the Hosgri earthquake being reported as having greater ground motion than the SSE.** [emphasis added]

However, rather than wait for the “process set forth in the March 12, 2012, request for information” (the post-Fukushima evaluation, a three-year program), the NRC remains complacent enough to put forth the increasingly incredible headline, “ADDITIONAL NRC ANALYSIS CONFIRMS EARTHQUAKE SAFETY AT DIABLO CANYON NUCLEAR POWER PLANT.”

NRC SHORELINE REVIEW AND IMPLICATIONS FOR UPCOMING SEISMIC STUDIES AT DIABLO CANYON

For a document that doesn't seem to attach much significance to the pending largest nuclear-related 3-D seismic data gathering effort in the world, the final gratuitous conclusion is mind-boggling:

“Evaluation of the current dataset indicates that it is sufficient to move forward with the new Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 PSHA.”

The SSHAC is an evaluation required of all nuclear power plants post-Fukushima. It is rated on a level of 1 to 4, based on increasing complexity of the seismic situation and analysis. ALL nuclear plants in the U.S. are required to complete at SSHAC level 3, including those in areas where seismicity is minimal. Thus, in mandating a level 3, no special significance is granted to the unique location of Diablo Canyon in the most seismically active state. As A4NR attorney John Geesman recently reminded the Diablo Canyon Independent Safety Committee, whose members include Dr. Robert Budnitz, co-author of the SSHAC process, if not at Diablo Canyon, what *would* merit a level 4? In addition, he reminded them that PG&E's earlier reasons for using

only a level 3 review—time and money—were no longer valid since the CPUC puts no cap on the costs of the studies, and the NRC’s timeline is increasingly flexible. Geesman's recommendation was met with a surprisingly positive response from the DCISC, and the video of attorney Geesman’s complete statement can be viewed at: <http://a4nr.org/?p=2385>

The offshore surveys themselves have been the source of much discussion. The consequences and impacts to the marine environment—and their mitigation—must not be taken lightly. A4NR continues to maintain that the studies are an important tool for future energy planning, and that they should be done only once, and only with the most qualified, expert, and peer reviewed resources. By all accounts, the research vessel *Marcus Langseth*, selected by PG&E to do this work, is failing to measure up to the task. As outlined in the “Cruise Summary” page of their most recent work, “Cascadia Open-Access Seismic Transects Cruise Report July 12-24, 2012,” principle investigators for the project raise some disturbing concerns about the *Langseth*:

...The cruise faced several challenges, including...shipboard mechanical and electrical failures...The mechanical/electrical problems were less anticipated, and were more numerous than should be expected in a 12-day cruise. [report may be downloaded at: <http://a4nr.org/?p=2368>]

It is to be determined if some of the mechanical failure might be due to the large volume of “used” equipment recently purchased for the *Marcus Langseth*. As the minutes of the July 12, 2011 Marcus Langseth Scientific Oversight Committee indicate, “Approximately \$5-6M of equipment for around \$400K was arranged. This is helping to bring the gear to more modern standards.” Ratepayers sponsoring the proposed PG&E studies may well wonder if the equipment for which they are paying has yet reached fully “modern” standards.

Coastal residents have a right to be concerned about whether the proposed seismic survey team will be able to achieve the results necessary on which to determine whether Diablo Canyon has a future as a source of energy. The Alliance does not argue that marine, fishing and Native American concerns should be ignored, rather that the 2007 earthquake at Kashiwazaki Kariwa Japan (knocking out 8000 MW of generation in 90 seconds) and the tragic and continued ramifications of Fukushima leave us with no other choice. Those in California should not underestimate the impacts of similar events on California’s fragile coast.

For a perspective on this difficult dilemma, please view a brief interview with Masaki Kito, a Tokyo attorney suing the directors and executives of TEPCO, owners of Fukushima, for their negligence in allowing that nuclear disaster to unfold. As the Associated Press reported on October 13, 2012: “Tokyo Electric Power Co. said in a statement that it had known safety improvements were needed before last year's tsunami triggered three meltdowns, but it had feared the political, economic and legal consequences of implementing them.” Mr. Kito is aware of the damage that disaster caused the fishing industry and marine life off of Japan. His video commentary on this topic is at <http://a4nr.org/?p=2392>

In addition, this broader view of the marine impacts of a nuclear disaster, as could befall Diablo Canyon, were explored by Ken Buessler, as senior scientist at the Woods Hole Oceanographic

Institution who has studied marine radioactivity since Chernobyl in 1986 and led an international research cruise off Japan in June 2011. Among his conclusions:

“...Other measurements show trends that are more worrisome. Levels of radioactivity found in fish are not decreasing and there appear to be hot spots on the seafloor that are not well mapped. There is also little agreement on exactly how much radioactivity was released or even whether the fires and explosions at the power plant resulted in more radioactive fallout to the ocean than did direct releases of radioactivity caused by dumping water on the reactors to keep them cool.
<http://a4nr.org/?p=2330>

There is no indication that canceling the seismic studies will result in shutting down a dangerously sited nuclear plant. There is certainly little, if any, political will to phase out Diablo’s reactors absent a full seismic review. And most important to the Alliance, there are several thousand tons of highly radioactive waste stored on the Central Coast—perhaps for hundreds of years—and currently no assurance that this waste is adequately protected from seismic scenarios that have been hypothesized by recognized experts.

The NRC’s abrogation of its duty to conduct scientific inquiry of the highest standards bolsters the need for California’s regulatory agencies to use all the tools at their disposal to assure that ratepayers and residents are guaranteed safe, clean, reliable and affordable energy.