

1. Good Afternoon. I would like to thank both Senator Monning and co-author Jackson for SB 657 (which became AB 361) and thank Assemblyman Achadjian for AB 361, which, although not specifically seismic, would be relevant in both preparation for or dealing with the aftereffects of a seismic disaster. Note that the OES is an important part of our county's defense and that its budget benefits from the stability provided by this ongoing funding mechanism. Likewise, thanks to Senator Monning for realizing that it is important to have a state Independent Peer Review Panel and that its work needs to continue, the need for which will hopefully become apparent as I proceed.

2. Today I speak as a ratepayer advocate. Since the power generated at Diablo is nuclear, the safety of the facility—its potential to harm people and the environment through discharge of radiation—is regulated by the *federal* NRC. Safety, however, comes at a price. And as the NRC itself has declared in its recent rejection of the petition by the SLO M4P for their intervention in the NRC relicensing proceeding for Diablo Canyon, *those economic concerns are rightfully our state's*:

[SLIDE 1: Page 11 of ASLB rejection of M4P](#)

As the Commission stated when it adopted the Part 51 regulations, the “determination of the economic viability of continuing the operation of a nuclear power plant is an issue that should be left to appropriate State regulatory and utility officials.” The NRC has no role in deciding whether a nuclear power plant should continue to operate based on economic considerations. *Atomic Safety & Licensing Board, ASLBP No. 10-900-01-LR-BD01*

3. Which brings us to: “Policy and regulation as it relates to seismic safety at the Diablo Canyon Nuclear Power Plant” as the agenda for today. First, some history:

When the state has abrogated or abdicated its responsibility to ratepayers, the results can be costly. During the original licensing

of Diablo Canyon, the NRC did not require, nor did PG&E seek, any analysis of potential offshore faults. Construction of the approximately \$350 million plant began in 1969. By 1971, the Hosgri fault was discovered, not by the NRC or PG&E, but by Shell Oil geologists, was found 3.5 miles offshore and capable of earthquakes greater than the plant's design basis. The resultant retrofitting and lack of oversight by the utility and its federal regulator ended up costing ratepayers an extra \$4.4 billion.

One might think that such errors are a thing of the past. They are not. Fast forward 40 years. In 2011, the NRC, responding to the discovery of the much closer Shoreline fault in 2008, declared that the fault was *segmented*, not linked to the Hosgri in a joint rupture scenario, and ended before extending on-land. In 2014, PG&E's research and conclusions contradicted those earlier and adamant NRC findings. This gives credence to the public's ongoing mistrust of the NRC.

Concerned with this pattern of lax regulatory oversight, Senator Monning's predecessor, Dr. Blakeslee, introduced AB 1632, which required the California Energy Commission to undertake:

[SLIDE 2: AB 1632](#)

Compilation and assessment of existing scientific studies that have been performed by persons or entities with expertise and qualifications in the subject of the studies, to determine the potential vulnerability, to a major disruption due to aging or a major seismic event, of large base-load generation facilities, of 1,700 megawatts or greater
AB 1632

Dr. Blakeslee's concerns were informed by the concurrent earthquake induced shutdown of the Karaiwa-Kashiwazaki nuclear plant in Japan in 2007. Although those reactors shutdown without the disastrous effects of the subsequent Fukushima event, enough *secondary* damage was done throughout the facility that it took the world's largest nuclear facility—7000MW—offline for years and billions of dollars in

repair, only to have it idled again in the post-Fukushima scenario. Thus, the recommendation from the CEC's AB 1632 Report: (read slide)

SLIDE 3: CEC AB 1632 Report

The non-safety related systems, structures and components (SSCs) of the plant are most vulnerable to damage from earthquakes. Damage to non-safety related SSCs is the greatest source of seismic-related plant reliability risk...[AND]... Evaluate the seismic vulnerability and reliability implications for the nuclear plants' non-safety related SSCs from changes to seismic design standards that have occurred since the plants were designed and built. *CEC AB 1632 Report, 2008*

How has PG&E complied—or not—with this recommendation initiated by our state's legislature to examine seismic impacts on *non-safety systems that are nonetheless vital to reliable and affordable electricity generation and transmission from Diablo Canyon?*

(read slide)

SLIDE 4: Balance of Plant Studies

In 2010 PG&E submitted a report by consultant Enercon addressing these issues. The report fails in two key ways:

- The work was performed many years before newly discovered and reinterpreted seismic hazards were identified in 2014
- The 2010 analysis uses an earlier EPRI database with ground accelerations lower than PG&E's 2014 maximum accelerations from faults and rock areas of lower velocity where these important non-SSCs are located

When questioned in a current CPUC proceeding as to this inadequacy, PG&E's response is that such non-SSC analysis was not directly part of the seismic study program funded under the particular CPUC decision authorizing certain seismic studies. That may be so. But it doesn't answer the questions that state energy oversight and regulatory commissions were asking. How will the increased shaking now predicted affect low velocity areas built on fill, such as switchyards, and other facility areas of concern?

If these updated calculations are not performed, the state's confidence regarding the reliability of the plant will rest solely

upon outdated analysis of data that failed to include the seismic threats identified by the AB1632 research. The legislature should continue to require a current response from PG&E and the IPRP should be tasked with its review.

The NRC may have the role of proclaiming that Diablo Canyon will be able to safely shut down in the event of an earthquake without discharging radiation into the environment. Let us assume that it does shut down safely. We've dodged a bullet! However, our state's concerns regarding damage and recovery left in the wake of such a scenario go beyond "safe shutdown": (read slide)

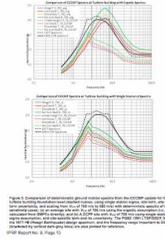
SLIDE 5: Unresolved AB 1632 issues

- Can the facility be restored to working order?
- How long will it take to restore the facility?
- What is the cost of restoring the facility?
- What will be the impacts of the outage on grid reliability?
- Cost of seismic retrofit requirements?

These questions, raised by AB 1632 and the CEC remain largely unanswered. And yet, the attendant risk remains.

4. Reliance solely on NRC oversight has been costly to our state's ratepayers. In addition to the historical Diablo failures I mentioned earlier, we have the more recent example of San Onofre, where the NRC's own Inspector General found the NRC staff at fault for lax oversight in administering the steam generator replacement. Those "approved parts" soon failed, causing the permanent shutdown of SONGS and leading to the nearly \$3.5 Billion controversial settlement foisted upon ratepayers. Thus, when considering our state's interest, there is value in the IPRP who, through their reports analyzing PG&E's seismic studies, have raised important concerns.

**SLIDE 6: IPRP report figure 5
Comparison of CCCSIP Spectra at Turbine Building with Ergodic Spectra**



As one example, take a look at their analysis of PG&E’s deterministic ground motion spectra from the CCCSIP using the ergodic method versus PG&E’s use of the single-station-sigma assumptions. One can see the effect of the greatly increased seismic hazards now understood from the seismic source characterization update and its effect on the shaking hazard at various frequencies—which the IPRP chart finds to exceed the existing standards now in effect at Diablo Canyon. Presenting the information in this clear and concise manner allows state regulators and ratepayers to grasp the difference in PG&E’s use of newer models populated with sparse data versus the more traditional analysis and understanding

The IPRP has brought this—and other significant issues—to the attention of the public. The IPRP’s inquiries may very well help prevent the oversight failures outlined at the beginning of my talk, seismic oversights that cost ratepayers billion of dollars. Their value is such that, thanks to the legislation spearheaded by Senator Monning, the IPRP has permanent standing for the remaining license of Diablo Canyon...legislation that passed every committee and chamber from start to finish without a single “no” vote.

Among other issues still raised but unresolved before the IPRP:

SLIDE 7: Unresolved IPRP concerns

- Discrepancies between empirical borehole measurements and new computer modeling
- PG&E’s lack of data for “near field” earthquakes in ground motion calculations
- PG&E’s assumptions of ground motion saturation capping earthquake concerns at M6.5
- PG&E’s misrepresentation of equal weighting of all 3 models for the Irish Hills, with a downward emphasis on the model it admitted had the greatest hazard impact

5. Where is this heading? After the creation of the AB 1632 program, Fukushima happened. As a result the NRC, in March 2012, required PG&E to perform an update on the seismic hazard at Diablo Canyon—which were delivered in 2015. PG&E used much of the raw data, already in process from the AB 1632 requirements, in this NRC report. For many of the questions that remain unresolved, PG&E’s response has been, “We’ll get to that analysis in the NRC report.” But *that* report is using a different benchmark....estimating how *likely and earthquake is*...and not how *bad will it be?*.... (ask for slide then) *as a reminder:*

SLIDE 8: Trusting the NRC...or our state?

- NRC failed to seek or find original seismic hazards at Diablo Canon site...
- **Multi-Billion dollar burden for California Ratepayers**
- NRC Inspector General faults NRC staff for failures in making technical decisions that led to closure of San Onofre....
- **Mutli-Billion dollar impact for California Ratepayers**

The NRC (and PG&E) are going to assess risk based on the *probability* of the greatest threat actually happening. In other words, the “worst case scenario” could be very bad, *but is it likely?* Recall, the original AB 1632 recommendations were looking for deterministic—worst case—scenarios. The California Coastal Commission agrees—and for them to issue the needed permit for Diablo’s license renewal, *they* will require *deterministic* hazard evaluations. And as we have seen from the previous IPRP graph, those deterministic hazards are greater than all previous assumptions. PG&E’s slight-of-hand can appear to diminish those risks, but is that a gamble that California’s ratepayers can take to the bank? Is it the strategy our state’s leaders can count on when planning to oversee reliable and affordable power for the world’s 7th largest economy?

The state’s interests go beyond the NRC’s concerns that the plant shut down safely in an earthquake. The state has further reaching concerns regarding the cost and reliability of electric power. The state—it’s agencies and legislature—can *and must ask* if the potential seismic risk from that point of view merits further investment of ratepayer dollars in this source of electric generation.