



ALLIANCE FOR NUCLEAR RESPONSIBILITY

PO Box 1328
San Luis Obispo, CA 93406
(858) 337-2703
(805) 704-1810
www.a4nr.org

July 9, 2013

California Energy Commission Dockets Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512



Re: Docket No. 13-IEP-1J

VIA E-MAIL DOCKET@ENERGY.CA.GOV

Re: 2013 Integrated Energy Policy Report Update: Pacific Gas and Electric Company Response to Nuclear Data Request

Please find attached supplement comments of the Alliance for Nuclear Responsibility for inclusion in the 2013 IEPR.

Kindly contact us if you have any questions.

Thank you.

Yours truly,

/s/
Rochelle Becker,
Executive Director

ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF:

(1) The effects of the nuclear fission thermal powerplant on system reliability and the affordable supply of electricity, including planned provisions for emergency operations and unplanned shutdowns as well as the costs of replacement power.

(2) The costs attributable to major disruptions in electrical generation due to aging or major seismic events that may require repair, replacement, or retrofit in excess of fifty million dollars (\$50,000,000) at the nuclear fission thermal powerplant.

The 2013 IEPR needs to address the concern that previous submissions and responses to these items prepared by PG&E and SCE in response to the AB 1632 studies have been rendered inadequate and out-of-date based on subsequent domestic and international events. Furthermore, it can be demonstrated that the fiscal forecasting requirements that may be deemed hypothetical or speculative by the utilities are actually being acknowledged as viable and potential by at least one of the nuclear utilities in California and the state Senate.

Many of the concerns raised by the AB 1632 requirements were motivated by the July 2007 earthquake that disabled the Kashiwazaki-Kariwa nuclear power plant in Japan. Although there was minimal offsite damage (500 gallons of radioactive water spilled into the Sea of Japan) there was a major disruption to the Japanese power grid because the crippled facility was capable of providing 8000MW of power.

However, the nuclear disaster at the Fukushima reactors in March of 2011 post dates many of the previous submissions and filings by SCE and PG&E with regard to their satisfactory responses to the questions posed by the AB 1632 assessments. The Fukushima disaster raised additional questions about seismic hazards assessments, seismic margins, the loss of on-site power, backup power, and evacuation. In addition, the massive amount of off-site damage also caused the NRC to consider modifications to its Severe Accident Mitigation Analysis (SAMA) protocols.

Since the Fukushima disaster, the NRC has instituted a Near Term Task Force (NTTF) to examine “lessons learned” from Fukushima, and to guide in the preparation of any new safeguards, regulations or backfit requirements that may arise from considerations of those lessons learned. Among the first two priority “tiers” of NRC requirements is the completion of a Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 for all the nuclear plants in the Western U.S., which includes Diablo Canyon, SONGS, and Palo Verde in Arizona. This will involve determining any updates to source characterization models, new computations of ground motion calculations, and from these inputs, determining if the current design basis for these nuclear plants provide an acceptable margin of safety. It is conceivable that the results may require retrofit or backfit decisions, both of which would have cost implications. This would not be unprecedented: When Diablo Canyon was first designed and built, the NRC did not require, and the CPUC did not ask about any possible offshore faulting. However, after the plant was nearly completed, a study by Shell petroleum geologists revealed the Hosgri fault, approximately 3 miles west of Diablo Canyon. As a result, the plant needed a retrofit that added \$4.4 Billion to the original price. All those costs were subsequently passed on to ratepayers.

Any analysis of potential costs that may arise from seismic backfitting would be premature until such time as the above referenced SSHAC proceedings are completed, and any approval of

ratepayer funding for license renewal would be imprudent before such issues are resolved. Only when any costs—if there are to be retrofits—are known is it possible to determine whether license renewal is prudent.

In addition, although PG&E and SCE may have addressed many of the pre-Fukushima questions raised by the AB 1632 report, neither utility has yet to fully address the most complex and costly of the requirement, “The California Energy Commission recommends that PG&E should use three-dimensional geophysical seismic reflection mapping and other advanced techniques to explore fault zones” near Diablo Canyon and SONGS. Although the current NRC post-Fukushima SSHAC process may proceed on a parallel path, this specific requirement stems from a state jurisdictional issue. Both utilities were granted ratepayer funding of approximately \$64 million each to conduct the studies. Thus far, only PG&E has attempted to execute their plan, however, they were denied a permit to conduct high-energy seismic reflection mapping by the California Coastal Commission. It remains to be seen what technical and procedural measure will need to be taken in order to fulfill the requirement to conduct the “three-dimensional geophysical seismic reflection mapping.” The CPUC president wrote, “This commission will not be able to adequately and appropriately exercise its authority to fund and oversee Diablo Canyon’s license extension without these AB 1632 issues being fully developed.”¹

Most significantly, the utilities claim that such a “future looking” cost-effectiveness study requires “speculation” and may be based on “hypothetical” events. However, these very “hypothetical” and “speculative” occurrences are being considered by the utilities as part of their internal “Enterprise Risk Management” protocol.

For example, PG&E has prepared a draft “Enterprise Risk Management” policy paper describing its function thusly:

The Enterprise Risk Management (ERM) Diablo Canyon Shutdown risk is defined as the risk of a core damaging event with the potential for radiological release, or extended shutdown of the plant (> 3 months, >\$100M) due to equipment failure, natural disaster, regulatory action, or other significant event.²

As events at the Fukushima Daiichi Nuclear Power Station in Japan revealed in March 2011, the potential for a reactor core damaging event with the potential for radiological release is real.... While the design of DCPD relative to the events is more robust than that of Fukushima, and DCPD does have some equipment, strategies, and other resources in place to mitigate beyond design basis events, it is not possible to predict all types of events that may occur, and gaps likely exist in the ability to mitigate “Beyond Design Basis” (BDB) events. As a result of the Fukushima Event, BDB accidents are now considered within the Enterprise Risk

¹ Letter from Michael Peevey, CPUC, to Peter Darbee, PG&E, June 25, 2009.

² PG&E, “Mitigation of Risks from Diablo Canyon Shutdown” prepared by Cary Harbor, March 28, 2012, obtained by data request in PG&E General Rate Case, GRC2014-Ph-DR_A4NR_001-Q15Atrch02, pp. 1.

Management framework.³

Among its findings:

Assessment of these risks without mitigation concluded that significant risks existed in 1) public and employee safety, health, and the environment insofar as a reactor core damaging event with potential radiological releases poses the risk of fatality or serious injury, loss of critical property (including the affected unit), and significant environmental releases/damage from the radiological release, 2) customer service, with the displacement of a significant population of customers and a measurable reduction in energy supply to the transmission system (> 2000 MW), 3) financial impact exceeding \$500M (>\$100M for extended shutdown) based on the cost of plant stabilization, replacement power, the labor and materials for restart of the unaffected unit (if allowed), and regulatory scrutiny, and 4) reputation through protracted public interest domestically (for extended shutdown) and internationally.⁴

In the above paragraphs, the concerns expressed as part of the PG&E Enterprise Risk Management mirror nearly identically the study items requested in earlier IEPR proceedings. Given the extended shut down beginning in January 2012 at SONGS, perhaps PG&E is asking itself these “ERM” questions because of the problems faced by SCE:

Events less severe than design basis events can interrupt the operation of one or both DCPD units for an extended period. This could result in significant economic and reputational costs to PG&E. Such events include failures of significant safety or power generation equipment forcing plant shutdown, events which cause the regulator to lose confidence in the ability of PG&E to operate DCPD in a fashion that assures public health and safety, and natural events which either challenge the design basis of the plant sufficiently that extensive efforts become necessary to demonstrate safe restart, or challenge the ability of offsite agencies to execute their responsibilities necessary to protect public health and safety should a design basis accident occur.⁵

The utility considers these risks—including those they may be unable “to predict”—along with their attendant costs and benefits to be useful in guiding their shareholder obligations. Should the state not require these same analyses—openly and transparently—on behalf of ratepayers, without whose revenue there would be neither corporate profits nor shareholder dividends?

The question of planning for “hypothetical” future events, such as unplanned outages, was raised in the California Senate in the wake of the Fukushima disaster. At a hearing on April 14, 2011, chaired by Senator Alex Padilla. The following transcribed exchange between chairman Padilla and the representatives of PG&E and SCE illustrate an attempt to by the state to ascertain what might happen “if” a “hypothetical” worst-case scenario would occur:

³ Ibid. p. 3.

⁴ Ibid. p.1.

⁵ Ibid. p. 3.

SENATOR ALEX PADILLA:

But are there rough numbers, thumbnail numbers, let's say the plants go down, they're not coming back up any time soon, uh, is it two days till restoring full power without rolling blackouts or brownouts? Is it 3-5 days? 3-5 weeks? Ratepayer impact? And I know it's not precise because it depends on the season, day of the week, all of that, but just thumbnail models?

GARY STERN, Resource Planner, Southern California Edison:

What we can say is we have some experience with some limited time during the past decade or so when both of the San Onofre units have been down at the same time. One time when that occurred for about, I want to say 4 days, in an October, I want to say it was 2007, there was a transmission emergency declared by the ISO. During other instances when the two units were down in other seasons—simultaneously—s there were no emergencies declared. So, as you pointed out it is very dependent on the situation. The absence of the plants doesn't mean that the lights would go out but it does mean that the grid doesn't have the reliability and stability to a satisfactory level so that there's a much greater likelihood or frequency that you would have those problems.

LOREN SHARP, Pacific Gas & Electric:

I guess I would answer from the way Diablo is designed and run with the outages being offset by the operations of the Helms hydro facility makes it less of a power perturbation, so I don't know that I have any data that I could that would say we've gone out and done that recently. I could get that perhaps for you later, but I don't have that.

SENATOR PADILLA:

The last way of asking the question is kind of a yes-no. Are you required to have these emergency plans in place to substitute for the loss of power.

STERN

The requirements that we have, involve what Ms. Khalon (CPUC staff) described as the "Resource Adequacy Review" requirements, which the state has on an overall basis. So we have enough capacity in the state, in the system, and in the local areas to handle expected forced outages, changes in weather conditions, etcetera. That process is not really designed to look at the long-term loss of large elements of generation or transmission, it's really designed to look at what you might normally expect over the course of a year in terms of unavailability of power when you might otherwise want it.

PADILLA

So, the worst-case scenario that you're asked to prepare for really isn't the true worst-case scenario is what I'm hearing?

STERN

I think that's a fair assessment. I think the idea is that that the unlikelihood of such an event makes it such that to spend the potentially billions of dollars against that low probability event doesn't appear to be warranted. It's like, you want to be able to have your car to work every day—sometimes your car might not operate—that's doesn't mean you should have a spare car sitting there just in case. At the same time, you know, sometimes your car is not going to operate.

PADILLA:

It's a risk benefit analysis.

STERN:

That's right.⁶

The "...unlikelihood of such an event" as a prolonged multi-year outage at a nuclear plant, promulgated by SCE's Mr. Stern, was disproven by the events of January 2012, when the steam generators failures initiated the ongoing outage of both units at SONGS. In retrospect, the questions regarding "hypothetical" future outages that Senator Padilla was expecting the utilities to plan for have materialized; alas, the solution was a quickly cobbled and makeshift response that did was not a part of a well organized, long term strategic solution.

The relicensing of nuclear power plants does not have a well established track record—only 4 years to date. The first nuclear plant to pass 40 years of operating life did so in 2009. How well such devices will fare 10 or 15 years into relicensing is subject to speculation. The Crystal River Nuclear Power Plant in Florida was relicensed in 2009, shortly before problems arising from its steam generator replacement caused its owners to make the decision to abandon the facility in 2012. A complex and contentious process is now underway in Florida involving their Public Services Commission and their legislature to determine where the costly liabilities lie—with the ratepayers or the utility. The Florida senate is currently proposing legislation aimed at refunding ratepayer investment in the failed project. California has the opportunity to ask—as Senator Padilla did—the "speculative questions" in advance in an attempt to make a reasonable and prudent plan and possibly avoid the crisis that now faces the ratepayers in Florida.

⁶ TRANSCRIPT from April 14, 2011. "Senate Energy, Utilities and Communications Committee hearing on Nuclear Power in California," From Video Disc 2 of 3.

ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF:

(3) Potential costs of responding to, or mitigating for, any new requirements that have arisen or are anticipated to become enforceable during the period of license extension.

The nuclear disaster at the Fukushima reactors in March of 2011 post dates many of the previous submissions and filings by SCE and PG&E with regard to their satisfactory response to federal NRC regulations regarding safety and operation of Diablo Canyon and SONGS. Since the Fukushima disaster, the NRC has instituted a Near Term Task Force (NTTF) to examine “lessons learned” from Fukushima, and to guide in the preparation of any new safeguards, regulations or backfit requirements that may arise from considerations of those lessons learned.

The first “tier” of these requirements is related to seismic hazard analysis updates, including performing a Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 program. This is expected of SONGS and Diablo Canyon and should be completed by 2015—however, that is not a firm date, and the licensee is required simply to “report” their findings by that date—which may include the finding that they “need more time” or “haven’t completed the analysis.” This “deadline” is not a “date certain” and the SSHAC may take longer to complete. This analysis may also determine whether or not the seismic design basis for the reactors is or is not adequate. The results may indicate that retrofitting is needed to make continued safe operation possible, and these retrofits will likely have costs that SCE and PG&E will request the CPUC to pass on to ratepayers. Therefore, any request for ratepayer funding for license renewal would be imprudent until the updated seismic analysis is complete.

There are also the potential costs associated with the expansion of emergency planning zones, and these are under review by the NRC as part of the NTTF. However, these activities are in the “Tier 3” level and are not going to take place until the middle part of this decade.

Likewise, there may be costs arising from the need to store high level radioactive waste on-site for more than the currently assumed time frame of 60 years (as maximum time the original Independent Spent Fuel Storage Installations—ISFSIs—at SONGS and Diablo Canyon may now be licensed). Changes in the NRC Waste Confidence Policy, which have already been challenged successfully once by intervenors in the federal courts, may require that an EIR look at possible on-site storage for as long as 160 years. Clearly there will be costs associated with that long-term storage which may offer a renewed perspective on the prudence of creating additional waste during a relicensing period.

There are also potential changes to the NRC regulatory structure currently scheduled for consideration by the Commission before the decade is out, and are different from the ones specifically referenced above. One particular change is to the SAMA, or Severe Accident Mitigation Analysis, which considers (among many things) the economic consequences of off-site damage—including agriculture, tourism and property loss—from a radioactive release. PG&E describes the process and explains the need to update their SAMA analysis for Diablo Canyon in their January 2010 application to the CPUC:

Severe Accident Mitigation Alternatives

10 C.F.R. Part 51 requires that license renewal applicants provide an analysis of alternatives to mitigate severe accidents if the NRC has not previously evaluated Severe Accident Mitigation Alternatives (SAMA) for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment. While the NRC has recognized that it is unlikely that any plant-specific consideration of severe accident mitigation alternatives for license renewal would identify major plant design changes or modifications determined to be cost-beneficial for reducing severe accident frequency or consequences, it could not conclude that SAMAs should be considered a Category 1 issue. Therefore, the NRC requires a plant-specific consideration of SAMAs for license renewal for plants lacking a previous SAMA evaluation in an EIS, related supplement or environmental assessment....

The NRC will collect information regarding the SAMA report during its environmental audit and will consider SAMA issues in the context of its scoping process and preparation of draft and final supplemental environmental impact statements addressing license renewal.⁷

However, since the time PG&E filed its CPUC application in 2010, the nuclear accident at Fukushima has changed the playing field for considering SAMA. While the NRC's Near Term Task Force on Lessons Learned from Fukushima (NTTF) still considers that, "[t]he NRC's current approach to the issue of land contamination from reactor accidents is sound,"⁸ NRC staff memorandum then go on to note that,

[o]ffsite property damage associated with the accident at the Fukushima Dai-ichi nuclear power plant in Japan in 2011 has initiated discussion on how the NRC considers offsite property damage following a significant release of radionuclides with subsequent contamination of the environment. In response to this discussion, the staff formed a working group with members from across the regulatory program offices and the Office of the General Counsel to review current approaches for considering offsite property damage within the regulatory framework and to identify options for modifying these approaches. Additionally, the staff held a public meeting on May 24, 2012, to inform the public of this effort and to solicit feedback.⁹

The staff then notes that the issues raised by Fukushima were serious enough for staff to begin to devise options for the Commission to consider in re-evaluating the standards for SAMA:

The accident at the Fukushima Dai-ichi nuclear power plant has prompted various external organizations and stakeholders to question whether the existing NRC

⁷ PACIFIC GAS AND ELECTRIC COMPANY DIABLO CANYON POWER PLANT LICENSE RENEWAL PREPARED TESTIMONY VOLUME I OF III, CHAPTER 6, pp.15-16.

⁸ Borchardt, R.W., US NRC, Consideration of Economic Consequences Within The U.S. Nuclear Regulatory Commission's Regulatory Framework, SECY-12-0110, August 14, 2012, p. 4.

⁹ Ibid. p. 1.

regulatory framework sufficiently considers economic consequences from radiological contamination. Therefore, should the Commission desire to expand consideration of offsite property damage, the staff has identified potential ways to revise the regulatory framework.¹⁰

In fact, the staff provided three options ranging from “status quo” to an overhaul of the SAMA program. Ultimately, they recommended the “middle” option, number two,

The staff recommends that the Commission approve Option 2. The staff has determined that this option would enhance the currency and consistency of the existing framework through updates to guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analysis.¹¹

The possibility clearly exists that the NRC will consider and may very well act on a reform of the SAMA policy, which could change the economic evaluations for offsite damage and loss due to a radiological release and therefore lead to modifications (and costs) in the safety requirements for the reactors. This data should be contemporary and available to California regulators responsible for safeguarding ratepayer investment in relicensing nuclear power plants. There is also precedent for the NRC to have revised its SAMA requirements. Once such was the Station Blackout Rule (SBO)—10 CFR 50.63 of 1988. A backfit analysis was conducted that quantified benefits, which included averted doses of radiation to workers and the public, and the costs, which included industry and NRC implementation and offsite property. It was concluded that the benefits outweighed the costs, thus supporting the backfit ruling.

Thus, it cannot be considered merely speculative that the NRC will be imposing requirements before the current licenses expire at California’s nuclear power plants which will affect operations into a relicensed period, should such a license be granted.

Further, the SAMA analysis memorandum also deals with the issue of “Current Staff Initiatives to Update...Replacement Power Costs,” noting:

In performing a regulatory analysis relating to power reactor regulatory actions, the NRC staff often identifies among the key impacted attributes those relating to replacement energy costs. Replacement energy costs may be required because a required regulatory activity needs to be performed while a plant is not operating. This is generally identified as an industry implementation cost and is specifically referred to as short-term replacement power. Also, replacement energy cost estimates could be the result of a decrease in the risk of an accident, the benefit of which can be estimated through the change in replacement energy costs for an operating reactor. This is generally addressed in the onsite property costs attribute and is referred to as long-term replacement power.¹²

¹⁰ Ibid. p. 6.

¹¹ Ibid. p. 9.

¹² Borchardt, R.W., US NRC, Consideration of Economic Consequences Within The U.S. Nuclear Regulatory Commission’s Regulatory Framework, SECY-12-0110, August 14, 2012, Enclosure 8, August 14, 2012, p. 1-2.

The NRC published estimates for plant-specific replacement energy costs for both the long and short term in NUREG/CR-6080 (October 1993) and NUREG/CR-4012, “Replacement Energy Costs for Nuclear Electricity-Generating Units in the United States,” (September 1997). By the NRC’s own admission, these analyses are outdated:

However, many changes have occurred in the electrical generation and transmission industries since the publication of these documents. Most significantly was the deregulation of the electric generation industry in several states and in the electrical transmission market. Furthermore, the Federal Energy Regulatory Commission (FERC) has instituted rulemakings over the time period which would also impact the transmission costs and, as a result, replacement energy costs. Given the time since the replacement energy values were last derived and the changes in market conditions, the NRC has been revisiting this concept and is initiating guidance revisions that will provide updated estimates.¹³

Item (1) and (2) at the beginning of these comments consider the effects of system reliability and affordability in the event of emergencies as well as planned and unplanned shutdowns of nuclear power plants as well the cost of replacement power. From this NRC notice it is evident that the “replacement power” guidelines for SAMA—which are considered as part of the relicensing application process—may be changing and therefore it is not unreasonable to consider any increased costs that may arise from these changes as important for state regulators to consider when evaluating the cost effectiveness of license extensions.

As regards the replacement power scenario and SAMA, the implications for California have precedent as well. With the discovery of a leak in the newly replaced steam generators at San Onofre in January 2012, there was a breach, though not released into the environment, of a primary radiation barrier, namely the steam generators. Because the steam generators provide a primary barrier against radioactive release, their integrity is considered in the SAMA analysis. Now shut down for over 16 months, the NRC may or may not permit the reactors to operate again. During this time, SCE has had to purchase replacement power for not just the on-site reactor functions, but its utility service district. Although the citation from the impending SAMA analysis considers this replacement power “an industry implementation cost and is specifically referred to as short-term replacement power,” the situation has now existed for 16 months. It will impact long-term replacement power for the utility and the region. Given the NRC staff statement, “the NRC has been revisiting this concept and is initiating guidance revisions that will provide updated estimates,” it is reasonable and foreseeable that the SAMA regulatory guidelines may change, and not imprudent to analyze costs that may arise.

¹³ Ibid.

ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF:
(4) Potential costs and impacts associated with current and accumulating high-level radioactive waste and its ongoing storage at the nuclear fission thermal powerplant.

PG&E and SCE can no longer assume, as they do in their current IEPR responses, that the federal government will begin taking possession of their high level waste at the end of the relicensed period. These costs would need to be updated and re-evaluated. The costs for storage, security and monitoring of on-site high level radioactive waste would have to be extrapolated over a much longer time frame than the period of the 20 year license extension due to the following substantive federal policy changes that have occurred.

- Federal cancellation of Yucca Mountain project; funding for Yucca Mountain removed from federal budget; DOE withdraws licensing application from NRC, DOE begins dismantling Yucca Mountain repository program by end of September 2010.¹⁴
- NRC Waste Confidence update EIS requirements: The Draft EIS now considers waste staying on site for at least 60 years, and possibly 100 additional years, beyond end of operation, for a total of 160 years. An option for indefinite storage, with canisters replaced every 100 years, is also considered until the spent fuel is transported to a disposal permanent site.¹⁵
- “The Waste Confidence EIS will also assume that the current structure of financial assurance for spent fuel storage will continue to exist. The responsible entities will provide the necessary financial resources for operating, securing, and maintaining storage facilities for extended periods of time, regardless of cost.”¹⁶

PG&E’s current and past IEPR responses predate the waste policy changes outlined above. Further, In PG&E’s 2010 CPUC relicensing funding application, the projected costs of operations and maintenance (O&M) for the 20-year license renewal period (which would capture ongoing maintenance, monitoring and security) as well as capital expenses for the Independent Spent Fuel Storage Installation (ISFSI) are only projected through the year 2044.¹⁷ Given the changes in federal policy, these numbers need to be extrapolated for a far longer period of time.

In its 2011 response to data requests of the CEC for its IEPR, PG&E provided the following answers regarding the status and plans for its spent fuel storage:

¹⁴ GAO Report to Senate Majority Leader, ” YUCCA MOUNTAIN: Information on Alternative Uses of the Site and Related Challenges” September 2011, pp. 4-5.

¹⁵ US NRC, Waste Confidence Generic Environmental Impact Statement—Draft Report for Comment, August 2013, pp. xxvii-xxviii.

¹⁶ Ibid. p. 12.

¹⁷ PG&E, Diablo Canyon Power Plant License Renewal, Prepared Testimony, Volume I of III, A.10-01-022, Chapter 3, tables 3-4 and 3-5, January 29, 2010.

The operational cost of maintaining the dry storage facility is approximately \$2.5 million (M) annually. This cost includes security and operational support. We do not have specific numbers for the cost to maintain and operate the systems that support the spent fuel pool operation. Cost/benefit studies have not been developed for the long term storage of spent nuclear fuel at the DCPD site. It is assumed in budget development, that PG&E will store spent nuclear fuel on site until the Department of Energy is ready to perform the removal. Estimates of Direct Cost for movement of spent nuclear fuel into dry storage have been developed and planned for the near term operating budgets. PG&E has developed a dry storage facility that is licensed and permitted to store all of the spent nuclear fuel generated during the 40 year licensed life of DCPD. It is still our position that the facility is an interim solution until the Department of Energy assumes their responsibility and collects the fuel for reprocessing or long term storage.¹⁸

From PG&E's answer it can be ascertained that spent fuel that is accumulated during a 20-year relicensed period will remain in the pools and not be moved to dry cask storage. PG&E's 2011 CEC IEPR responses do not reflect current federal policy when they write,

PG&E's preferred approach for additional spent fuel storage is to either ship the spent fuel to a Federal waste repository or waste reprocessing facility....If PG&E operates for an additional 20 years, at the end of the extended operating period, the NRC-permitted Independent Spent Fuel Storage Installation (ISFSI) will be full and the spent fuel pools will be full. In order to decommission, PG&E must remove the spent fuel from the spent fuel pools. Spent fuel may not be moved sooner than 5 years after operations cease. In order to support decommissioning, the spent fuel stored in the spent fuel pools would have to be moved into dry storage, if the Department of Energy is unable to collect and remove the spent fuel by that time. During the decommissioning period, PG&E would have to permit and construct an additional ISFSI.¹⁹

Given the changes in federal policy, PG&E can be reasonably expected to analyze and predict costs for permitting and constructing an additional ISFSI as well as the O&M costs for maintaining spent fuel pools until all waste is moved to an ISFSI. These costs are not found in their January 2010 CPUC Application. PG&E states, "We do not have specific numbers for the cost to maintain and operate the systems that support the spent fuel pool operation." It would seem prudent that PG&E should be required to obtain and report on those specific numbers at the very least for the number of years it would take for all the waste generated during a relicensed period to be effectively cooled in the pools, and the time needed to keep the waste in the pools until an additional ISFSI can be permitted and constructed. In addition, current technology requires that any repackaging of waste canisters that may become damaged must be done under water. Currently this task is performed in the spent fuel pools. The NRC, in its Waste Confidence analysis, states that waste canisters may require repackaging during the extended on

¹⁸ California Energy Commission, Docket 11-IEP-1J, PG&E responses, Nuclear Data Request in the 2011 Integrated Energy Policy Report, June 9, 2011, p. 15.

¹⁹ Ibid. p. 19.

site storage.²⁰ Therefore, it would prudent—unless PG&E can demonstrate a technological solution to the issue of waste repackaging—to estimate the cost of keeping the spent fuel pools serviceable to perform this repackaging task during the potential extended on-site storage.

With regard to SCE's plans for analyzing the long term costs of high level radioactive waste, one must rely on their 2011 answers to Data Requests from the CEC for the 2011 IEPR. SCE's responses to the question of extended on-site storage and associated costs date from 2011:

“SCE has not estimated the costs for relying indefinitely upon onsite storage facilities. See the response to D.13 for used fuel storage costs at the ISFSI. No cost/benefit study on the costs and risks of long-term or indefinite onsite used fuel storage exists. In the absence of Yucca Mountain or any other off-site used fuel repository, a cost/benefit study cannot be done.”²¹

And:

“SCE's budgeting system does not separately identify operating and maintenance (O&M) costs for the SONGS ISFSI. These costs are embedded in the annual SONGS 2 & 3 Base O&M expenses. SCE has not developed an estimate of such costs resulting from delays in shipment to offsite storage through the end of the current operating license or through a period of extended operation.”²²

On April 16, 2013, the NRC issued an information notice to licensees regarding the implications of humid environments on the reliability and durability of ISFSI waste storage systems. In this notice, the NRC documents material failures and corrosion at an ISFSI using upright dry canisters (like Diablo Canyon) and a horizontal system (like San Onofre), noting,

The effects of weathering and environmental moisture may lead to degradation of structures, systems, and components....Second, since humidity and deliquescence have been shown to contribute to stress corrosion cracking in marine environments (see Information Notice IN2012-20, ADAMS Accession Nos. ML12139A440), the combination of pooled water and heat from canisters containing irradiated spent nuclear fuel could produce humid conditions within the storage system.²³

To address with this, operators at the Peach Bottom nuclear reactor, “returned the spent fuel assemblies to the spent fuel pool to perform additional inspections on the cask lid and seals.”²⁴ Diablo Canyon and San Onofre are seaside reactors, and subject to marine environments with potential salt corrosion. This raises the concern that, absent an alternative technological solution

²⁰ US NRC Plan for the Long-Term Update of the Waste Confidence Rule and Integration With the Extended Storage and Transportation Initiative, SECY-11-0029 Accession Number: ML110330445, March 15, 2011.

²¹ California Energy Commission, IEPR 11-IEPR DATA REQUEST SET 11-IEP-1J CEC-SCE-001, Prepared by: Tony Llorens, 04/25/2011 p. 56.

²² California Energy Commission, IEPR 11-IEPR DATA REQUEST SET 11-IEP-1J CEC-SCE-001, Prepared by: Robert Bledsoe, 04/25/2011 p. 77.

²³ US NRC, Information Notice 2013-07: Premature Degradation Of Spent Fuel Storage Cask Structures And Components From Environmental Moisture, April 16, 2013, p.4. ADAMS Accession No. ML12320A697

²⁴ Ibid. pp. 1-2.

(and the costs thereof), an active spent fuel pool will be required for maintenance issues regarding on-site storage of spent fuel for the duration of the storage. Therefore, the need to maintain operable spent fuel pools for the duration of on-site waste storage cannot be ruled out. Neither PG&E nor SCE have nor can, by their own admission, provide detailed, itemized costs for operating their spent fuel pools. SCE in 2011 wrote, "SCE's accounting system does not separately identify operations and maintenance (O&M) costs for the SONGS 2 & 3 used fuel pools. These costs are embedded in the annual SONGS 2 & 3 Base O&M expenses."²⁵ PG&E states, "We do not have specific numbers for the cost to maintain and operate the systems that support the spent fuel pool operation."²⁶

Finally, on April 24, 2013, a non-emergency event notification for the ISFSI at Diablo Canyon was posted by the NRC:

"On April 24, 2013, at 09:02 PDT, Diablo Canyon Power Plant (DCPP) determined that the loading procedure for the independent spent fuel storage installation (ISFSI) multi-purpose canisters (MPCs) placed the MPCs in an unanalyzed condition. The procedure (approved for use in 2009) contained steps to install vent caps on the MPC vents while the MPC contained an air/water mixture. This placed the MPC in an isolated condition without any relief path while water was in the MPC (a condition previously not analyzed in the DCPD ISFSI FSAR).²⁷

While the NRC did not conclude that there was any long term damage likely, based on engineering considerations, it should be noted that the casks in question have less than a decade of recordable time in use. Should a condition have arisen that required the casks to be disassembled, the highly radioactive fuel within them would have needed to be handled underwater, requiring the ongoing presence of the spent fuel pools to perform this operation.

To conclude, the existing responses provided by PG&E and SCE for the anticipated costs of long term on-site storage of high level radioactive waste are no longer relevant given changes in federal policy. These changes in federal policy are in process, with measurable timelines and cannot be considered unforeseeable or speculative. License renewal will increase by nearly 50 percent the volume of waste that will be created at each site, and the proportionally increased expenses with which it is associated must be part of any consideration of the cost/benefit of license renewal.

²⁵ California Energy Commission, IEPR 11-IEPR DATA REQUEST SET 11-IEP-1J CEC-SCE-001, Prepared by: Tony Llorens, 04/25/2011 p. 67.

²⁶ California Energy Commission, Docket 11-IEP-1J, PG&E responses, Nuclear Data Request in the 2011 Integrated Energy Policy Report, June 9, 2011, p. 15.

²⁷ US NRC, Event Notification Number: 48965, Diablo Canyon, 10 CFR Section: 72.75(d)(1) - SFTY EQUIP. DISABLED OR FAILS TO FUNCTION, April 24, 2013.

ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF
(5) Potential costs and impacts associated with mitigation or alternatives to the use of once-through cooling at the nuclear fission thermal powerplant.

OVERVIEW:

On May 4, 2010 the State Water Resources Control Board (SWRCB) adopted a policy on the use of coastal and estuarine waters for power plant cooling. The policy became effective October 1, 2010, and requires thermal fossil plants using OTC technology to retrofit using alternative cooling technologies, such as cooling towers, or to shut down no later than the end of 2020. The OTC policy also established separate requirements for the state's nuclear-fueled power plants, and for achieving full compliance with the policy by implementing alternative cooling technologies such as a closed cycle cooling system (i.e., cooling towers) or shut down by December 31, 2022. The OTC policy requires completion of special studies conducted by an independent third party within three years of the effective date of the policy (October 2013). These studies are to assess alternatives for the nuclear-fueled power plants to meet OTC policy requirements. Pursuant to the policy, the SWRCB must consider the study results in evaluating whether to modify the compliance requirements for nuclear-fueled power plants.

As of their 2011 responses to the CEC, SCE provides the following status on their mitigation plans for the OTC policy:

The SWRCB OTC policy requires plants utilizing OTC to reduce their intake of cooling water by installing closed-cycle wet cooling systems or by reducing intake to a comparable level by alternative means. Installing a closed-cycle wet cooling system (i.e., cooling towers or the equivalent) has been evaluated and is not feasible at SONGS 2 & 3. A retrofit with a closed-cycle cooling system at SONGS 2 & 3 would face unparalleled engineering challenges, insuperable permitting obstacles, and adverse environmental impacts likely greater than those associated with OTC.

Consistent with the directives of the California Coastal Commission (CCC), SCE has fully mitigated for the impact of SONGS 2 & 3 on the marine environment. Cooling towers are not feasible at SONGS 2 & 3. The estimated costs for cooling towers will not be included in the cost benefit assessments due to it not being feasible. Alternative means of compliance will be required to allow SONGS 2 & 3 to enter a period of extended operation; however, SONGS 2 & 3 cannot operate beyond 2022, even if the CAISO determines it would be necessary, unless NRC license renewal had been obtained.²⁸

²⁸ Southern California Edison, IEPR 11-IEPR DATA REQUEST SET 11-IEP-1J CEC-SCE-001, Prepared by: Geetha Eva Shanmugasundaram, April 25, 2011.

PG&E provided the following responses for Diablo Canyon:

Currently, the options and costs for complying with the State Waste Resources Control Board's (SWRCB) final treatment of DCPD under its once-through cooling policy are indeterminate for the nuclear facilities. In accordance with the policy, as of March 28, 2011, a Nuclear Plant Review Committee has been convened to assess compliance options for both Diablo Canyon and SONGS.

The Nuclear Review Committee is not scheduled to complete the assessment, and report final findings and/or recommendations to the SWRCB, until October 01, 2013. It will not be possible to determine compliance options and estimated costs until the in-progress review is complete, and the SWRCB has finalized the policy with respect to the nuclear plants.²⁹

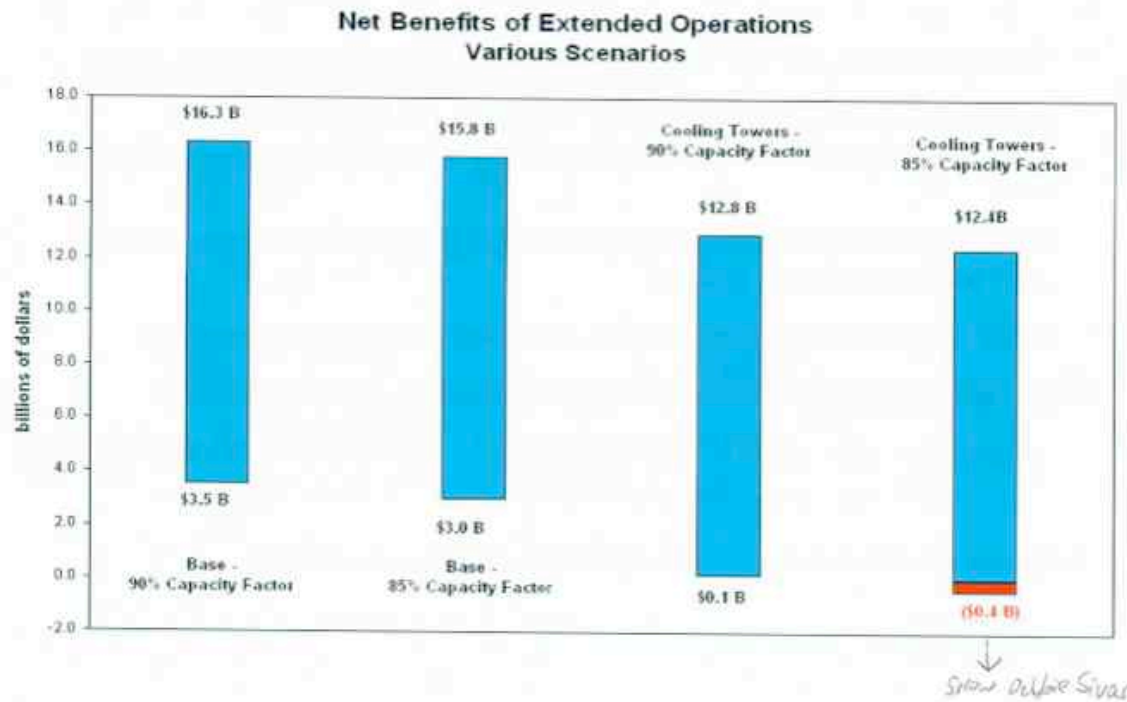
Thus, any claim by the utilities that costs have already been provided for these potential major changes in cooling methodologies is unsubstantiated, as final estimates await the outcome of the SWRCB evaluations. However, in their January 2010 application for license renewal funding to the CPUC, PG&E did provide their estimate of the impact of these costs.

At a DCPD License Renewal Application economic analysis workshop held on July 28, 2010, a Power Point presentation by PG&E "Looked at total cost of operating plant through current license life, then purchasing energy capacity of 20 years, vs. renewing license and continuing to operate through 2045." (slide 2)

Their actual January 2010 CPUC application looked at cost effectiveness with both 90% and 85% capacity factors (slide 11) and the graphs on slide 12 indicated overall net ratepayer benefits of license renewal of \$3-3.5 Billion. *Those assumptions were based on continuing use of existing Once-Through-Cooling without modification.* However, the Division of Ratepayer Advocates submitted a Data Request (DRA DR-005) to PG&E and requested to see the calculations if cooling towers were needed. The resulting graph at slide 12 (below) indicates that with cooling towers at 90% capacity the savings is \$ 0.1 Billion and with cooling towers at 85% capacity, there is a loss of \$ 0.4 Billion. It is evident from these 2010 calculations that the net benefit ranges from negligible to "loss" if mitigation for once-through-cooling is considered. Also note that PG&E *did not include these calculations with their actual application.* It is therefore not unreasonable nor unforeseeable to require that these calculations be performed for any subsequent or new applications for license renewal funding, as their impact could greatly affect an analysis of overall ratepayer benefit and the decision making process.

²⁹ DOCKET NO. 11-IEP-1J PG&E'S RESPONSES TO CEC'S NUCLEAR POWER PLANT DATA REQUESTS
DCPD IEPR, June 9, 2011, p. 12

Results



ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF
(6) Potential costs and impacts associated with expanding and maintaining emergency planning zones.

After the Tohoku earthquake and nuclear accident at the Fukushima nuclear power plant in March 2011, the US NRC recommended that US citizens then visiting or residing in Japan evacuate to a distance of at least 50 miles from the crippled nuclear facility. “The Japanese experience raised questions in the United States about radiological emergency preparedness for commercial nuclear power plants, particularly as populations near plants have grown.”³⁰ What would be the fiscal impacts upon state and local governments if either a temporary or permanent requirement to plan for a 50 mile evacuation zone were required for either of California’s nuclear power plants?

The cost implications need to be considered to determine the prudence of maintaining a nuclear generating infrastructure during a license renewal period—and beyond—for emergency planning must remain in place as long as high level radioactive waste is stored on site. As will be subsequently documented, the NRC is considering modifications to the emergency planning zones (EPZ) and has a published time frame for the study, so this action cannot be considered “remote, speculative or unforeseeable.”

The issues were raised by the federal GAO in a report released in March, 2013, which also clarifies local and state responsibilities for EPZs.

FEMA regulations and guidance apply where local and state authorities take responsibility for managing off-site radiological emergency preparedness efforts for the public near nuclear power plants. Specifically, local and state authorities develop radiological emergency response plans for their jurisdictions using the planning standards and guidance detailed in the REP program manual. These off-site plans are to define specific actions and activities that local and state emergency response organizations should take to protect the public from a potential incident at the nearby nuclear power plant.³¹

At California’s nuclear power plants, the immediate emergency planning zones vary from 12-18 miles, slightly larger than the 10 mile radius at the other U.S. facilities. The GAO staff specifically requested to study a western US reactor, and chose San Onofre, “...because it was the only plant outside the East Coast that met some of our criteria, including that it has the second highest population in the country within 50 miles of a plant.”³²

As part of the immediate post-Fukushima “Near Term Task Force” priorities of the NRC (Tier 1 and Tier 2), current emergency planning zones were reviewed and considered adequate.

³⁰ GAO-13-243 EMERGENCY PREPAREDNESS: NRC Needs to Better Understand Likely Public Response to Radiological Incidents at Nuclear Power Plants March 2013, p. 1-2.

³¹ Ibid. pp. 11-12.

³² Ibid. p. 4.

However, as the GAO reports, “NRC officials told us that the agency might consider a review of the basis for the emergency planning zone size in the future.”³³

In fact, this is more than speculation. Although expansion of EPZs is not on the first two tiers of the NRC’s post Fukushima recommendations, it is emplaced in Tier 3, with goals and a timetable:

In the coming years, there are extensive plans to further study the potential health effects for the released radioactivity from the Fukushima site.... The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) plans a two-year assessment of Fukushima impacts; and a major initiative is planned, the Fukushima Health Survey, that will inform future more detailed dose assessments by recreating the whereabouts of every Fukushima prefecture resident from the time of the March 11 nuclear accident onwards. The NRC staff will continue to monitor the results of these efforts, and their potential implications regarding the U.S. regulatory approach to emergency planning around nuclear power plants, including the EPZ size.³⁴

The timeline for NRC action is:

The staff will use the results of the Level 3 PRA and the UNSCEAR assessment to inform the process of evaluating the EPZ basis. This effort could take 3 – 4 years to complete.³⁵

If the studies take 3-4 years to conduct, that would put completion in the timeframe of 2016-2017, which is within the permitted time that NRC allows licensees to apply for relicensing (not less than 5 years before expiration of the current licenses). Thus, the costs of meeting any changes or recommendations that come from potential regulatory revisions could be included in a utility application for license renewal funding at that time.

Of particular importance to densely populated California is a secondary issue regarding the adequacy of evacuation planning, one highlighted by the GAO report:

In addition, 2011 NRC guidance directs that evacuation time estimates include a consideration of shadow evacuations, defined as an evacuation of the public in areas outside an officially declared evacuation area. Specifically, the guidance states that these evacuation time estimate studies should include a shadow evacuation consideration of 20 percent of the population out to 15 miles away from the nuclear power plant. In addition, NRC guidance states that the shadow population consideration is to account for the extent to which this population’s evacuation would impede the evacuation of those under evacuation orders.³⁶

³³ Ibid. p. 9.

³⁴ US NRC: Tier 3 – SECY-11-0137 Additional Recommendation 3 Program Plan for Basis of Emergency Planning Zone Size, Pp.41-42.

³⁵ Ibid. p.42.

³⁶ GAO-13-243, pp.14-15.

The GAO then provides critical review of the NRC’s methodologies with regard to computing shadow evacuation time and process:

According to NRC and FEMA officials, their agencies have not examined public awareness outside the 10-mile emergency planning zone and therefore do not know if a 20-percent estimate of shadow evacuations is reasonable. Therefore, licensee evacuation time estimates may not accurately consider the impact of shadow evacuations. Without estimates of evacuation times based on more solid understanding of public awareness outside the 10-mile zone, licensees and NRC and FEMA cannot be confident about the reliability of their estimates. If shadow evacuations are not correctly estimated, planning for a radiological emergency may not sufficiently consider the impact of the public outside the 10-mile emergency planning zone. Shadow evacuations outside this zone greater than the assumed 20-percent rate would put additional traffic on roadways, possibly delaying the evacuation of the public inside the emergency planning zone and potentially increasing the risk to public health and safety.³⁷

The GAO report then solicited input from local communities, including very relevant metropolitan California regions:

For example, Los Angeles County authorities told us that one of their greatest concerns in the event of an incident at the San Onofre Nuclear Generating Station is a rumor that results in shadow evacuations, which could result in clogged highways as people who are not in danger choose to evacuate unnecessarily.³⁸

To conclude, the issues of expansion of Emergency Planning Zones and the ancillary issue of planning for “shadow evacuations” remain very much in play. Both could affect and require upgrades or modifications to the existing infrastructure, monitoring, equipment and personnel required to conduct such an evacuation should it be required. In addition, all the requirements for emergency preparedness will need to remain in place as long as the high level waste is stored on site. Should these changes be required—which may be known in the next half decade—there may be costs and expenses that must be documented in order to determine whether extending nuclear operations are in the ratepayer’s best interests. **Even though the SONGS reactors have been retired, the spent fuel will remain in the pools, and then on site, posing the threat of radiological release and the need for emergency planning and evacuation for decades—if not centuries—to come.**

³⁷ Ibid. p. 25.

³⁸ Ibid. p. 23.

ONGOING CONCERNS AND POTENTIAL COST/RELIABILITY IMPACTS OF:
(7) Costs associated with achieving compliance with requirements for federal consistency certification granted by the California Coastal Commission to the electrical corporation, required for relicensing of the nuclear fission thermal powerplant by the federal Nuclear Regulatory Commission.

As both of California's nuclear power plants are located within the coastal zone jurisdiction, they are required to receive a federal consistency certification from the California Coastal Commission (CCC) as part of their federal NRC license renewal process. As of this date, only PG&E has applied for license renewal at the NRC, and the CCC has responded to both the utility and the NRC that the process is incomplete:

[r]enewal of PG&E's NRC operating license for Diablo Canyon Power Plant is subject to federal consistency review by the Coastal Commission, pursuant to the requirements of the California Coastal Management Program (CCMP) and the associated federal regulations at 15 CFR 930 *et seq.* PG&E submitted a consistency certification to the Commission in December 2009; however, as detailed in the attached December 29, 2009 letter from the Commission staff to PG&E, that certification is incomplete, in part due to the need for the results from updated seismic studies. As stated in that letter, PG&E must provide the following information to allow the Commission to determine whether the project conforms to the CCMP:

“[c]haracterization of the Hosgri and Shoreline Faults, including fault geometry, seismicity, and sense of movement; estimates of maximum credible earthquake (from a deterministic perspective) on these and all other faults; the ground shaking expected at the site from such earthquakes; and the deep crustal structure beneath the plant....and... “as recommended by the Technical Advisory Team established pursuant to AB 1632, ...the three-dimensional seismic data....collected and interpreted as part of this evaluation.”³⁹

By applying to the NRC for license renewal in November 2009, PG&E was attempting to start the process long before they had initiated a plan to commence the studies that the CCC would need in order to make its determination. PG&E's CPUC application of January 2010 does include a caveat in which they admit they are unsure of what actions and resources will be necessary to meet the CCC requirements:

At this time, PG&E cannot define with absolute certainty the state approvals that may be required to obtain renewed operating licenses for Diablo Canyon. Nor can

³⁹ Detmer, Allison, letter to Kimberly Green, NRC, “Information Required for Federal Consistency Certification...” March 12, 2010, p.1.

PG&E predict with certainty the mitigation that may be required by state or local agencies that may have discretionary permitting authority over the project.⁴⁰

In addition to meeting the requirements of the CCC, a Coastal Development Permit may be required from the County of San Luis Obispo (County) pursuant to its Local Coastal Plan, from the Coastal Commission pursuant to its retained jurisdiction, or from both.

As such, PG&E's application notes:

Finally, if a CDP is required and issued for license renewal, it is reasonable to assume that, like the CDPs issued for the Independent Spent Fuel Storage Installation (ISFSI) and the Steam Generator Replacement Project (SGRP), it will be subject to appeal and there will be additional costs associated with PG&E's participation in the appeals process. Accordingly, PG&E reasonably included in the cost estimate for the License Renewal project \$6.49 million in direct costs to obtain state approvals associated with renewal of the Diablo Canyon operating licenses. This estimate is based on PG&E's recent experience undergoing environmental and coastal review and permitting for the Independent Spent Fuel Storage Installation and the Steam Generator Replacement Project at Diablo Canyon.⁴¹

Subsequently, the entire process of meeting the CCC equivalency requirements became a contentious and lengthy process, particularly with regard to the requirements for seismic evaluations. PG&E parsed out the need for "the three-dimensional seismic data" into a separate proceeding at the CPUC, claiming that such information was not required for license renewal, but for "ongoing operations." Regardless of PG&E's determination, the CCC still required that new 3-D seismic data for *their* equivalency review. PG&E did not begin requesting funding, conducting scoping and planning the 3-D seismic studies until the 2011-2012 time frame. Once funding was granted, permits were needed from the State Lands Commission as well as the CCC. Although a permit was granted by the SLC, a series of contentious hearings surrounded the issues of marine wildlife impacts and the effects of 3-D seismic testing. PG&E's application to perform the tests was denied by the CCC in fall, 2012. The CCC has publicly relinquished their requirement to review the 3-D seismic data; they have denied PG&E the ability to collect that data, using the methodology and process that PG&E had proposed. Are other options and methods available to collect this data that will result in less impact to the marine environment? Are these methods that the CCC is likely to approve? Will the future attempt at license renewal require greater costs than the approximately \$6.5 million PG&E had budgeted for the permitting process, and the nearly \$64 million they had received for the actual seismic studies? It is possible that PG&E grossly underestimated the potential of their actions being "subject to appeal" which would greatly increase costs. Since these issues remain open and unresolved, they are ripe for revisiting in subsequent applications by the utilities.

⁴⁰ PACIFIC GAS AND ELECTRIC COMPANY DIABLO CANYON POWER PLANT LICENSE RENEWAL PREPARED TESTIMONY VOLUME I OF III, CHAPTER 7 STATE PROCESS AND ASSOCIATED COSTS, p.7-2.

⁴¹ Ibid. p.7-4.

As for SCE/SONGS, SCE has also applied for and received \$64 million to conduct seismic studies in the region of SONGS. Because the greatest anticipated seismic threat to SONGS may be far enough offshore to avoid the need for CCC permits, it is undetermined at this time what complexities may arise in that process. However, there will need to be near-shore permitting from the CCC, and because of the facility's location on leased US military property, there may need to be negotiations or mitigations with the US Navy. The potential costs of these processes, permits and mitigations need to be carefully evaluated. As of this date, the SONGS reactors have been retired, and it awaits evaluation by the Independent Peer Review Group convened by the CPUC to determine in what manner the remaining funding for SONGS advanced seismic studies should be directed.