

Comments of Pacific Gas and Electric Company  
November 4, 2014  
on the report:



Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling  
(OTC) System for Diablo Canyon Power Plant  
September 2014

Prepared by Bechtel Power Corporation for the SWRCB and Nuclear Review Committee

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide further comments to the State Water Resources Control Board (State Board) on the Alternative Cooling Technologies Report prepared by Bechtel Power Corporation (Bechtel Report) at the direction of the Nuclear Review Committee established by the State Water Board's Once-Through Cooling Policy (OTC Policy).<sup>1</sup> It is important to acknowledge that the OTC Policy clearly sets out the criteria by which the State Board is to evaluate the Bechtel Report and determine the appropriate compliance approach for the Diablo Canyon power plant (Diablo Canyon).

Our comments focus on the report development process included in the OTC Policy, specific comments on Bechtel's evaluation of various technologies, and the application of the OTC Policy's criteria for establishing alternative compliance requirements for Diablo Canyon based upon the results of the Bechtel Report.

## I. EXECUTIVE SUMMARY

### OTC Policy Development

The OTC Policy was developed over a five-year process, including multiple stakeholder workshops. The State Board and its staff considered several approaches and balanced many competing concerns including grid stability and the state's greenhouse gas (GHG) reduction goals. Key points include:

- The adopted Policy makes a clear distinction regarding nuclear facilities and finds that, given their unique contribution to reaching the state's GHG goals, a separate approach is warranted.
- The Policy establishes a Nuclear Review Committee (Committee) to oversee the development of an independent feasibility assessment—and this process was followed by the Committee and Board staff, including selection of Bechtel as the independent third-party consultant, development of the report and review of various drafts.
- The Policy establishes specific criteria by which the Report should be evaluated to determine alternative compliance requirements for Diablo Canyon.

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<sup>1</sup> As part of the Nuclear Review Committee process, PG&E previously submitted comments to the Committee and State Board on July 26, 2013, August 9, 2013, October 17, 2013, August 11, 2014, and September 12, 2014. We hereby incorporate our previous comments by reference.

The Bechtel Report is the Most Detailed Assessment of Alternative Technologies Completed for Diablo Canyon

The Bechtel Report is an independently prepared, comprehensive assessment developing preliminary designs and estimating costs, permitting, and construction schedules for three major alternative approaches: cooling towers, fine-mesh intake screens and offshore wedgewire screens. The Report clearly demonstrates that the retrofit of the cooling water intake system at Diablo Canyon is an extremely difficult, complex and costly option that also raises many performance and safety concerns. The Report leaves no doubt that it would be an unprecedented undertaking. Key points include:

- PG&E, four other Nuclear Review Committee members, and multiple stakeholders and the State Board's Expert Review Panel, believe that both screening technologies are very unlikely to reduce overall impacts.
- Additionally, both screening technologies raise serious operational concerns due to the high likelihood of clogging and biofouling which are likely to increase plant trips and could present safety issues.
- Freshwater cooling tower options are estimated to cost between \$8.6 – \$11.7 billion and require an excavation larger than the Panama Canal that will permanently impact approximately 400 acres north of the plant. The cost range for dry cooling options is higher still, reaching \$14.1 billion.
- Saltwater tower options, while less expensive than a freshwater installation, are estimated to cost between \$6.2 – \$8.0 billion and raise significant operational and safety concerns regarding salt deposition, plant security, and derates (reduction in net generation exported to the grid). It must also be noted that while there are facilities with brackish water towers, there are currently no saltwater towers at any nuclear facility in the world.

Environmental Impacts at Diablo Canyon are Proportionately Low

At the time the OTC Policy was adopted in 2010, Diablo Canyon accounted for 22% of the state's average once-through cooling flow, but only 8% of entrainment and 1% of impingement. Thus, it is critical to acknowledge that Diablo Canyon's proportional share of the state's OTC impacts at the time of policy development was substantially less than its share of cooling water flow. This is due to both the plant's location and the design of its cooling water system—mitigations to impact that were incorporated in the original construction of Diablo Canyon. Further, if only the nuclear plants are considered, although the plants' flow rates are roughly equivalent, San Onofre Nuclear Generating Station (SONGS) accounted for 79% of entrainment and 98% of impingement at the two plants at the time the policy was adopted - a far more significant level of impact, which has been eliminated with the closure of SONGS.

Results of the Bechtel Report Support Alternative Requirements for Diablo Canyon

The OTC Policy very clearly establishes the criteria by which the State Board must evaluate the Bechtel Report and determine if alternative compliance requirements are necessary. The State Board is to establish alternative requirements for Diablo Canyon if either the costs of a retrofit are "wholly out of proportion" to the costs considered by the Board when adopting the OTC Policy or if a retrofit is "wholly unreasonable" based on factors including engineering, permitting

or space constraints, public safety considerations and environmental impacts including air emissions. An evaluation of the Bechtel Report demonstrates the following:

- The screening technologies do not appear likely to achieve the objectives of the OTC Policy.
- The costs of the cooling tower options are without question "wholly out of proportion" to the costs considered by the State Board—ranging from four to nine times the \$1.6 billion retrofit cost estimated in the Tetra Tech Report cited in the OTC Policy.
- Given the size of the required excavation, the freshwater cooling tower options placed north of the existing plant are clearly "wholly unreasonable" based on engineering and permitting constraints, as well as the significant adverse environmental impacts from the loss of 400 acres of canyon lands.
- The saltwater tower options raise numerous questions regarding salt deposition, plant security and safety which render them "wholly unreasonable."

The bottom line is that the results of the Bechtel Report justify adoption of an alternative compliance approach for Diablo Canyon as clearly established in the OTC Policy. The Policy allows for an alternative approach and requires mitigation for any remaining impacts.

## II. STATE OTC POLICY AND NUCLEAR REVIEW COMMITTEE PROCESS

In order to effectively evaluate the Bechtel report and determine compliance requirements, it is necessary to review key components of the OTC Policy and the process established for nuclear-fueled plants. The policy clearly intends to evaluate compliance for nuclear facilities separately from fossil-fueled plants.

The OTC Policy Specifically Acknowledges the Unique Contribution of Nuclear Generation  
Without question, the OTC Policy acknowledges both the unique nature of the state's nuclear-fueled facilities and the contribution of nuclear generation to achieving the state's Greenhouse Gas reduction goals.

Section 1 of the OTC Policy acknowledges that the Global Warming Solutions Act of 2006 requires California to reduce GHG emissions to 1990 levels by 2020 – and explicitly recognizes that nuclear facilities are critical to meeting this mandate, as well as emerging nationwide and international reduction requirements. OTC Policy, Section 1, Paragraph L. The section also notes that the plants are entering relicensing proceedings to extend NRC licenses to approximately 2045. The policy then goes on to state: "in recognition of these considerations and others, this Policy requires special studies for the nuclear-fueled power plants to address their unique issues, and to evaluate appropriate requirements for those plants." Id.

Since the policy was adopted, Southern California Edison (SCE) announced the early retirement of the SONGS, adding an estimated seven million metric tons of CO<sub>2</sub> annually from replacement generation. This increase, coming as California is looking to further reduce GHG emissions by

80 percent between 2020 and 2050, virtually necessitates a flexible approach to OTC Policy compliance for Diablo Canyon. If the State's OTC Policy requires that Diablo Canyon's cooling system be retrofit, GHG emissions may increase due to extended outages necessary to install cooling towers, as well as the significant post-retrofit generation derates associated with any closed-cycle cooling system.

The specific approach for the nuclear plants is established in section 3.D of the OTC Policy. OTC Policy Section 3.D.(1)-(9). This section includes not only the creation of a Nuclear Review Committee to oversee development of an alternatives assessment, but specific criteria to evaluate the results of the report and to establish compliance requirements for the plants.

#### Selection of Bechtel as Third-Party Consultant was a Collaborative Process

The OTC Policy requires that the State Water Board Executive Director select a contractor to perform an independent alternative technology evaluation, overseen by a Nuclear Review Committee (Committee). OTC Policy, Sec. 3.D.(1)-(3). After a detailed scope and selection process that was vetted by the Committee, the utilities identified a short list of contractors with the required nuclear industry and cooling system engineering and construction experience, and which did not have current significant commercial conflicts with either facility. This list was reviewed by the Committee prior to submittal to the Executive Director. The Executive Director found all contractors on the list acceptable, and Bechtel was selected from this list based on the strength of their overall expertise, project implementation plan and cost bid.

#### The Preparation of the Report was an Independent Process Overseen by the Committee

The report prepared by Bechtel is an independent report that was extensively reviewed with the Committee and the public. As required by the OTC Policy, all scoping as to report content and focus was done collaboratively with the Committee. The Phase I report, outlining various options for further study, was reviewed by the Committee and a collective decision made as to which technologies would be evaluated in Phase II. PG&E provided Bechtel physical access to the plant, and any engineering and plant operational data requested to facilitate preliminary technology design and report preparation. Members of the Committee were invited to participate in Bechtel's plant site visits and were provided access to Bechtel's project progress review and work planning conference calls.

PG&E and SCE reviewed initial drafts of technology design documents for security purposes to ensure that certain drawings or other report materials were redacted as necessary prior to disseminating publically. Following the initial security reviews performed early in Phase II of the project, all subsequent drawings and reports were provided simultaneously to the SWRCB and the Utilities. SCE terminated participation in the special studies as of the June 2013 SONGS retirement announcement.

#### The Policy Establishes a Process for Determining Compliance Requirements for Nuclear Plants

As indicated earlier, in acknowledgement of the unique regulatory framework and environmental position of the nuclear plants, the OTC Policy sets out a specific assessment process for these plants. The OTC Policy requires the Board to establish alternative compliance requirements if

either the cost of retrofits are “wholly out of proportion” to the costs considered by the State Board in establishing the policy, or if installation of retrofit technologies is “wholly unreasonable” based on factors including engineering constraints, permitting constraints, space constraints, and public safety considerations, as well as adverse environmental impacts. OTC Policy, Sec. 3.D.(8). Thus, the State Board must evaluate the results of the Bechtel study against these criteria to determine the appropriate compliance approach for Diablo Canyon.

While the State Policy is considered more stringent than the recently adopted federal rules,<sup>2</sup> the federal rules also provide for a site-specific evaluation of entrainment, and incorporate a cost-benefit approach as allowed under the Supreme Court's 2009 Entergy decision.<sup>3</sup> In this way, the OTC Policy's approach for nuclear plants is in keeping with both the legal requirements under Section 316(b) of the Clean Water Act and the approach adopted by U.S. EPA for all facilities, regardless of fuel type. The federal regulations clearly support the concept that cost-benefit issues, along with issues like grid reliability and adverse environmental impacts such as GHG emissions, can be considered in developing a standard.

### III. COMMENTS ON BECHTEL REPORT

PG&E worked closely with the State Board staff, the Committee and Bechtel to ensure that Bechtel had the necessary access and information to prepare a thorough report. We provided detailed comments for Bechtel via the State Board and the Committee on all drafts. Our comments focused primarily on ensuring the accuracy of safety, engineering, and operating assumptions used as the basis for Bechtel's assessment.

Bechtel's final report provides the most detailed assessment to date of the installation of alternative cooling technologies at Diablo Canyon. It must be noted that as the level of detail in each successive evaluation increases, so do the estimates of cost, technology installation complexity, and outage down-time required to implement a plant retrofit. Particularly with reference to the cooling tower options, there is no doubt that a retrofit at Diablo Canyon would be a tremendous engineering and construction effort. There is simply no precedent for a cooling tower retrofit of the magnitude and complexity required at Diablo Canyon. And further, there is no precedent for saltwater towers at any nuclear facility.

From a permitting and authorization perspective, PG&E's assessment is that a Nuclear Operating License Amendment Request (LAR) will be necessary for all technology options with the possible exception of the intake fine mesh screen option—and the Diablo Canyon Independent Safety Committee (DCISC) shares this opinion.<sup>4</sup> The need for a LAR will add cost, time and complexity to any permitting process as described in Bechtel's Report.

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<sup>2</sup> 79 Fed. Reg. 48300 (Aug. 15, 2014), 40 CFR Parts 122 and 125 (subparts I, J, N).

<sup>3</sup> Entergy Corp. v. Riverkeeper Inc., 129 S.Ct. 1498 (U.S. 2009)

<sup>4</sup> DCISC, Letter to Jonathan Bishop, Exhibit A, September 5, 2013; DSISC, Attachment 1 (DCISC Evaluation of Safety Issues for Bechtel Addendum), October 17, 2014.

Below is a summary of PG&E's previous comments on each technology option evaluated in the final report.

### Screening Technologies

#### Fine Mesh Screens

PG&E's concern with the fine mesh screen alternative is that it appears to be the worst of both worlds -- potentially achieving no real reduction in marine impacts, and likely causing significant operational issues. While initial work done by Tenera<sup>5</sup> states that 1mm mesh could reduce entrainment losses by at most 39.7%, further work completed by Tenera for the Review Committee concludes that "studies at DCPD show that the vast majority of the fishes entrained were very small and based on other studies, the probability of these larvae surviving impingement, screen-wash systems, and fish return would be very low."<sup>6</sup> Thus, the upside is no more than a 40% theoretical reduction in entrainment losses, and it is highly likely that a large percentage of now impinged larvae would not survive in any case. Bechtel does not adequately address this probability. This concern is shared by other commenters including the State Board's Independent Scientist Expert Review Panel on Ocean Intakes and OTC Impacts, and Friends of the Earth.<sup>7</sup>

Further, operational issues regarding biofouling and clogging in a saltwater marine environment have not been adequately addressed. PG&E believes that these issues—lack of environmental benefit and operational concerns—when evaluated together, demonstrate that this technology would not achieve the OTC Policy's objective.

#### Wedgewire Screens

As with fine mesh screens, PG&E is concerned that there is no evidence that this option will provide any environmental benefit, and there is no evidence that the technology will work in an open ocean environment. Wedgewire screens are predominantly a freshwater river-based technology; there are no existing installations in an open ocean environment. Thus, there are serious concerns regarding operability and effectiveness of the technology at Diablo Canyon. Additionally, implementation of the technology would permanently impact a sizable area of currently undeveloped near-shore marine habitat.

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<sup>5</sup> Tenera Environmental, Evaluation of Fine-mesh Intake Screen System for the Diablo Canyon Power Plant, August 2013 (prepared for Nuclear Review Committee, available on State Board website).

<sup>6</sup> Tenera Environmental, Report Supplement: Length-Specific Probabilities of Screen Entrainment of Larval Fishes Based on Head Capsule Measurements, October 29, 2013 (prepared for Nuclear Review Committee, available on State Board website).

<sup>7</sup> See e.g. Professor Gregor Calliet, Letter to Maria de la Paz Carpio-Obeso, State Water Board Ocean Unit Chief, October 30, 2013 (Technical Expert Review of Tenera documents (ESLO2013-17.3 and ESLO2013-038.1) and Supplement (ESLO2013-17.4); Professor Peter Raimondi, Letter to Maria de la Paz Carpio-Obeso, State Water Board Ocean Unit Chief, November 20, 2013 (Review of "Report Supplement: Length-Specific Probabilities of Screen Entrainment of Larval Fishes Based on Head Capsule Measurements (Incorporating NFPP Site-Specific Estimates)." October 29, 2013); Friends of the Earth, Comments on September 2013 Bechtel Phase 2 Final Technologies Assessment for Alternative Cooling Technologies at Diablo Canyon Power Plant, November 19, 2013.

Given the lack of existing open ocean installations, as Bechtel indicates, it would be necessary to perform a substantial pilot study to assess the adequacy of the technology for the Diablo Canyon location. The one-year pilot study proposed by Bechtel is clearly insufficient to answer the complex questions necessary to determine whether to proceed with an installation. Any pilot study must be conducted for a minimum of two years, and preferably three or four years, in order to appropriately assess potential operability, debris loading, and corrosion issues in an open ocean saltwater environment. Given year-to-year variability in weather and ocean conditions, corrosion in a saltwater environment, and other factors, one year is simply not enough time to adequately evaluate these issues.

Additionally, PG&E believes that installation of wedgewire screens would require an 8-month dual-unit outage and thus, substantial replacement power costs would also be incurred during project implementation. An outage of this magnitude would add approximately \$560 million in replacement power costs to the \$456 - \$602 million cost estimate provided by Bechtel, roughly doubling the installation cost.

However, as with the fine mesh screens, the real issue with wedgewire screens is the low probability that they will truly improve larval survival via entrainment exclusion and reduction, coupled with the high probability of significant operational issues.

### Cooling Towers

#### Freshwater – North

PG&E continues to believe that *these options do not meet the OTC Policy's compliance criteria* given the enormous estimated cost of between \$8.6 - \$11.7 billion, as well as the extraordinary scope of the required excavation. Permitting for the excavation and the installation will be incredibly difficult, if not impossible, given the tremendous environmental footprint and adverse impacts.

These options all essentially require the removal of a mountain – with excavation between 190 million and 316 million cubic yards – to create a 62- or 109-acre level pad for the cooling towers. To put the size of the proposed excavation in perspective, the Panama Canal required an excavation of approximately 240 million cubic yards for the 48-mile long passage. The excavation would require approximately 310 acres of canyon area north of the plant to be filled to a height of between 320 and 500 feet. Thus, at a minimum, these approaches would irreversibly impact roughly 400 acres of undeveloped coastal land north of the current plant site.

Further, though requested for evaluation by the Committee, PG&E believes that the reclaimed water component of this option is unworkable. Given the state's drought situation, there are far better uses for this reclaimed water than providing less than 10% of the water needed for Diablo Canyon freshwater cooling towers, and the adverse environmental impacts of building the piping system must be considered as well.

### Saltwater – South

Although less costly than the freshwater options, the estimated installation cost of between \$6 – \$8 billion, along with safety and operational concerns, permitting challenges and significant unit derates, clearly indicate that *these options do not meet the OTC Policy's compliance criteria* for installation at Diablo Canyon.

The towers will contribute significant salt drift and the report notes only that there will be an “additional level of effort” needed to address detrimental effects. The actual impact of salt drift, including the potential for adverse impacts to generating unit operability in certain conditions, has not been fully defined. Though prevailing winds at the plant site are generally from the northwest, which would drive the salt plume away from the plant during those periods, 14-15% of the time during an average year the wind direction would drive the salt drift immediately over and onto the exposed high-voltage electrical system infrastructure of both Unit 1 and Unit 2, potentially causing plant trips due to flashover (arcing), and thereby adversely impacting reliability. Further, additional maintenance activities may not be sufficient to reduce elevated risks of electrical system flashovers and potential unit/reactor trips due to those faults.

The Diablo Canyon Independent Safety Committee shares these concerns. The DCISC’s comments on the Bechtel Report conclude that “the impacts of southern siting of cooling towers on plant access during construction, and the impacts of increased salt deposition on plant equipment from use of salt-water cooling, would both have the potential for substantially more negative safety impacts than would northern siting and use of reclaimed and desalinated water.”<sup>8</sup> In addition to this overall conclusion, the DCISC also concludes the following relative to a southern saltwater option:

- Logistics for maintaining effective plant access for normal operations and emergency response, as well as physical security requirements, are all substantially more complex.
- Installation of cooling water ducts in the protected area will impact operability and require design changes to the emergency diesel generator fuel tanks and the auxiliary saltwater system and require analysis for new flooding risk for safety-related equipment.
- Design of proposed temporary emergency diesel generators requires careful review.
- It is likely that temporary rerouting of auxiliary saltwater lines to maintain the spent fuel pool cooling, followed by replacement, will be needed, adding some adverse risk to plant operational safety.
- Saltwater cooling towers will result in a large increase in the rate of salt deposition having the potential to create negative impacts on some safety-related systems—in particular, the emergency diesel generators, ventilation systems for the Auxiliary Building, Control Room, and Fuel Handling Building. Further, higher rates of deposition will also reduce the reliability of outdoor high-voltage systems that play a major role in plant safety, increase the frequency of loss of off-site power events, and produce negative

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<sup>8</sup> DSISC, Attachment 1, October 17, 2014, page 14.



impacts on the long-term safety of the spent fuel casks in the independent spent fuel storage installation.<sup>9</sup>

Another issue which requires further assessment is the viability of air permitting for the 900 tons per year of PM-10 emissions associated with saltwater towers. Air permitting for PM-10 presents a potentially significant challenge and the permitting process would take time for SLO-APCD to develop. While there are examples of air districts within California that have used road paving as an offset to PM-10 emissions, the scope of the examples are not similar to the proposed saltwater cooling tower retrofit of Diablo Canyon, and the scale of emissions offsets approved in other jurisdictions are significantly less than what would be required here. Additionally, many factors such as traffic counts, vehicle speed, and road composition must be estimated and evaluated to calculate the required road miles that must be paved to provide sufficient offsets. It is not realistic to use Mojave Desert-area data to estimate needed road miles in San Luis Obispo County. Lastly, the process to develop and approve offsets at the local air district level would be considerable, and pre-construction approval of a Prevention of Significant Degradation of Air Quality (PSD) permit would require approval of U.S. EPA.

The saltwater cooling tower installation would derate the power plant between 192 and 244 MWs. This is a significant derate, and would cost between \$78 - \$100 million (2013 dollars) in replacement power on an annual basis following retrofit.

The report does not address the total additional costs for ongoing plant operations following retrofit, which will likely be in the range of \$98 - \$120 million a year. This number includes the replacement power costs for the significant plant derate, increased operations and maintenance, and costs to shuttle employees to the site from offsite parking locations.

In summary, while the installation costs may be less than those estimated for freshwater towers and the excavation is less significant, the still massive costs of saltwater cooling towers are again “wholly out of proportion” to what the State Board considered in adopting the policy, and their installation still raises many serious issues regarding impacts on plant operability, safety and security.

#### IV. COMMENTS FROM A GROUP OF COMMITTEE MEMBERS MISINTERPRET THE OTC POLICY

Comments submitted by four Committee members incorrectly conclude that there is no basis for an exemption for Diablo Canyon from the OTC Policy because cooling towers are a viable option. This conclusion completely misinterprets the process established by the State Water Board in the OTC Policy.

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<sup>9</sup> Id. at 14-15.

If "viability" was the only measure to consider, the State Board would not have incorporated the Committee process and independent third-party review of alternative technologies into the OTC Policy. There are already several existing reports, prepared both by PG&E's consultants and the State Board's consultant, that indicate cooling towers are potentially feasible strictly from an engineering and construction perspective. The purpose of the independent third-party review process and additional analysis was to provide the State Board with additional, more detailed information to assess using the criteria in the OTC Policy. This includes information on cost, scheduling, permitting and engineering challenges, as well as operational and safety issues. The Board established a separate process for the nuclear plants, and now the Board must evaluate the Bechtel Report in light of the criteria included in the OTC Policy:

The State Water Board shall establish alternate requirements for Diablo Canyon if the State Water Board finds that for implementation of Track 1 either:

- (1) the costs are wholly out of proportion to the costs identified in the Tetra Tech Report
- or
- (2) compliance is wholly unreasonable based on the factors in paragraphs 7(b) and (c) (engineering, permitting or space constraints and public safety considerations and environmental impacts including air emissions)

The Policy explicitly establishes a consideration and balancing of factors in determining whether retrofits at nuclear plants are required. The Board must consider costs and the factors included in the Policy -- not just whether installation is "possible" at any cost or under any circumstances. If the Board finds that either of the above conditions is met, then alternative compliance requirements must be established.

The OTC Policy also requires that if the Board establishes alternative requirements, the "difference in impacts to marine life resulting from any alternative, less stringent requirements shall be fully mitigated." OTC Policy Section 3.D.9. Thus, the OTC Policy explicitly acknowledges that based on an evaluation of the Bechtel Report and the criteria in Paragraph 8, alternative, less stringent requirements may be established and that mitigation will be required.

V. ENVIRONMENTAL IMPACTS FROM ONCE-THROUGH COOLING AT DIABLO CANYON ARE RELATIVELY LOW

It is important to note that at the time the OTC Policy was adopted, although Diablo Canyon accounted for roughly 22% of the state's average once-through cooling flow, it accounted for only 8% of entrainment and 1% of impingement. Thus, Diablo Canyon's proportional share of the state's OTC impacts at the time of policy development was substantially less than its share of cooling water flow. This is due to both the plant's location and design.

Additionally, when operating, SONGS accounted for 32% of all entrainment statewide and 79% of entrainment from nuclear plants, and 39% of all impingement statewide and 98% of impingement from nuclear plants. Thus, Diablo Canyon represents only a small portion of entrainment and impingement -- whether evaluating impacts from a statewide or nuclear-specific perspective. When the nuclear plants are considered in isolation, the retirement of SONGS equates to a 79% reduction in entrainment and a 98% reduction in impingement impacts from nuclear-fueled plants. This fact further underscores the appropriateness of alternative compliance at Diablo Canyon, the state's last remaining GHG-free OTC resource.

From an impingement standpoint, the plant's technical working group comprised of independent scientists overseen by the Central Coast Regional Board agrees that impingement is insignificant. This is due to the design of the plant's intake, with a low approach velocity (about 0.6 mph), a sheltered cove which inhibits schooling of fish near the intake, calm fish return bays which facilitate the return of fish to the intake cove and open waters, and the predominance of marine species which are naturally strong swimmers due to the open-ocean setting. Overall, Diablo Canyon impinges less than 3.0 pounds of biomass each day on average. This can be compared to SONGS, which when operating impinged roughly 90 pounds a day.

Finally, studies by local scientists, as well as EPRI, have assessed fisheries in the vicinity of Diablo Canyon and have not detected any significant decline in populations of species.<sup>10</sup> Additionally, biological monitoring required by the plant's NDPES permit – on-going since before the plant began operation – demonstrates little change in fish populations at the control stations located north and south of the plant.<sup>11</sup> Fish populations have remained robust and largely stable over the life of the plant – and this would support the fact that entrainment has not caused significant adverse impacts to marine life in the vicinity of the plant.

## VI. CONCLUSION

PG&E believes that the Bechtel Report provides the State Board with sufficient information to determine that alternative compliance requirements are clearly justified for Diablo Canyon. The Bechtel Report provides the most detailed assessment to date in terms of design, implementation schedule, and costs of various alternative technology options. There can be no question as to the firm's expertise in power plant engineering and construction, and they were selected with the full involvement of the Committee.

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<sup>10</sup> EPRI, Assessment of Once-Through Cooling System Impacts to California Coastal Fish and Fisheries (2007); Stephens et. al., Rockfish Resources of the South Central California Coast: Analysis of the Resources From Partyboat Data, 1980–2005 (2006).

<sup>11</sup> Tenera Environmental, Thermal Effects Monitoring Program Analysis Report (Chapter 1 – Changes in Marine Environment Resulting from the Diablo Canyon Power Plant Discharge) (1997); Tenera Environmental, Diablo Canyon Power Plant Receiving Water Monitoring Program: 1995 - 2002 Analysis Report (2002).

Diablo Canyon's GHG-free generation is more important than ever to California's GHG reduction goals, particularly given the closure of SONGS. Thus, the OTC Policy's approach of creating a separate path for nuclear plants remains sound and justified.

Using the criteria established in the OTC Policy, the closed-cycle cooling technology costs estimated in the Bechtel Report are without a doubt "wholly out of proportion" to the costs considered by the State Board. Further, all of the closed-cycle cooling technologies, as well as the screening technologies, raise issues regarding engineering, permitting and safety constraints, as well as adverse environmental impacts, which would render installation "wholly unreasonable" under the second prong of the OTC Policy's evaluation criteria. Thus, the State Board must establish alternative compliance requirements for Diablo Canyon and any remaining impacts will be fully mitigated through funding provided to the State Coastal Conservancy as required under the OTC Policy.