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PG&E

and the
State Water Resources Control Board
Nuclear Review Committee

Independent Third-Party Interim Technical Assessment

for the

Operational Strategies to Reduce Impingement and Entrainment for Diablo Canyon Power Plant

Prepared by

BECHTEL

Bechtel Power Corporation

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Revision	Date	Affected Sections
0	July 22, 2012	Initial Issue

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List of Abbreviations and Acronyms

agl	above ground level
APCD	(San Diego) Air Pollution Control District
ATC	Air Pollution Control District Authority to Construct
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CCRWQCG	Coastal Commission Regional Water Quality Control Board
CDFG	California Department of Fish & Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utility Commission
DCPP	Diablo Canyon Power Plant
EPCRA	Emergency Planning and Community Right-To-Know Act
FAA	Federal Aviation Administration
fps	foot per second
gpm	gallons per minute
GWA	Government of Western Australia
mgd	million gallons per day
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
OHP	Office of Historic Preservation
PG&E	Pacific Gas and Electric
PTO	Air Pollution Control District Permit to Operate
RC	Resource Commission
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SPCC	Spill Prevention Control and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Council Board
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USMC	U.S. Marine Corps
WDR	Waste Discharge Requirement

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1. Executive Summary

This study summarizes the findings of the first phase of a detailed evaluation to assess viability of the operation strategy technology cooling system option to once-through cooling for the Diablo Canyon Nuclear Power Plant (DCPP), which supports the Nuclear Review Committee's initiative to identify strategies to implement the California State Water Resources Control Board (SWRCB) statewide policy on the *Use of Coast and Estuarine Waters for Power Plant Cooling*, that is, strategies that comply with the Section 316(b), *California Once-Through-Cooling Policy*, Phase II rules.

The operation strategies considered within this technology fall into two main categories:

- Cooling Water Flow Rate Reduction
- Fish Deterrence Systems

DCPP is a base-loaded power plant, which is designed to operate at full capacity, except during periods of maintenance, repair and refueling. Some marine resource benefits could be realized by reducing load generation (and ocean water withdrawal rates) during off-peak seasons when power demand is lower. However, it is not expected that the off-peak season load reduction and the corresponding reduction in entrainment loss and impingement mortality from available reduction available at DCPP.

Second, no fish deterrent technology was identified that has a proven deterrent record in the relatively cold water environment that exists at DCPP.

Note that modifications to add a fish collection and return system to each traveling screens with changing screen panels to fine mesh screens are covered in the inshore mechanical fine mesh technology report and therefore they are not covered here.

The only substantive permits or approvals that will potentially apply to this cooling water option are the county-led California Environmental Quality Act (CEQA) process and an amendment to the existing National Pollutant Discharge Elimination System (NPDES) permit. Both the CEQA review and NPDES amendment processes are not expected to be contentious or lengthy. While this cooling system option may provide only limited improvements relative to Section 316(b), *California Once-Through Cooling Policy*, Phase II performance expectations for impingement and entrainment, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria, which would preclude this option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process, which would preclude the operational strategies to reduce impingement and entrainment from further consideration.

Criterion	Status
External Approval and Permitting	No fatal flaws
Impingement/Entrainment Design	Cannot satisfy 316B California Once-Through Cooling Policy Criteria Phase II requirements.
Environmental Offsets	Weak overall net positive benefit

Criterion	Status
First-of-Kind-to-Scale	Not conducted
Operability of General Site Conditions	Not conducted
Seismic and Tsunami Issues	Not conducted
Structure and Construction	Not conducted
Maintenance	Not conducted
Conclusion	Technology is not a candidate for Phase 2 review

Thus, the operational strategies to reduce impingement and entrainment technology, when employed solely as the best technology available, cannot satisfy the requirements of the Section 316(b), *California Once-Through Cooling Policy*, Phase II rules in a meaningful way. Consequently, this cooling system technology option is not offered as a candidate for further investigation in Phase II of this study.

2. Background and Introduction

2.1 Purpose/Scope of Study

This study is performed in accordance with the requirement established by the SWRCB for Pacific Gas & Electric (PG&E) to conduct a detailed evaluation to assess compliance alternatives to once-through cooling for the DCPP. This requirement is associated with the *California Statewide Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* that established uniform, technology-based standards to implement the Clean Water Act Section 316(b), which mandates that location, design, construction, and capacity of the cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts.

This report describes the detailed evaluation of the operational strategies to reduce the impingement and entrainment for DCPP based on the list of site-specific criteria approved by the Nuclear Review Committee. The evaluation process includes critical review of published data and literature, consultation with permitting agencies and technical assessment supported by engineering experience and judgment. No new field data was collected as part of this effort. The results of the evaluation are used to characterize the feasibility of this technology and its possible selection as a candidate for further investigation in a follow-on phase of this study.

2.2 Regulatory History

2.2.1 Federal

The U.S. Environmental Protection Agency (USEPA) has proposed standards to meet its obligations under the Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. Specifically, this section requires that NPDES permits for facilities with cooling water intake structures ensure that the location, design, construction, and capacity of the structures reflect the best technology available to minimize the harmful impacts on the environment. These impacts are associated with the significant withdrawal of cooling water by industrial facilities, which remove or otherwise impact significant quantities of aquatic organisms from the waters of the United States. Most of the impacts are to early life stages of fish and shell fish through impingement and entrainment. Impingement occurs when fish and other aquatic life are trapped against the screens when cooling water is withdrawn resulting in injury and often death. Entrainment occurs when these

organisms are drawn into the facility, where they are exposed to high temperatures and pressures—gain, resulting in injury and death. (USEPA, 2011)

In response to a consent decree with environmental organizations, the USEPA divided the Section 316(b) rules into three phases. Most new facilities (including power plants) addressed in the Phase I rules, initially promulgated in December 2001. Existing power plants were subsequently addressed, along with other industrial facilities, in the Phase II version of the rules, issued in February 2004. Since then the rule has been challenged, remanded, suspended, and re-proposed. The current proposed version of the rule dictates that all existing facilities that withdraw more than 2 million gallons per day (mgd) of water from waters of the U.S. and use at least 25 percent of the water they withdraw exclusively for cooling purposes would be subject to:

- Upper limit on the number of fish killed because of impingement and determining the technology necessary to comply with this limit, or

- Reduce the intake velocity to 0.5 feet/second (through-screen) or below, which would allow most fish to avoid impingement.

Large power plants (water withdraw rates 125 mgd or larger) would also be required to conduct studies to help their local permitting authorities (SWRCB) determine site-specific best technology available for entrainment mortality control. Note this version abandoned the original performance standards approach, which mandated the calculation of baseline against which reduction in entrainment and impingement can be measured.

The Section 316(b) Phase II final rule is expected to be issued on July 27, 2012. When the final rule become effective it is likely to include an implementation timeline, which would drive the implementation of technologies to address the impingement requirements within 8 years (2020).

2.2.2 State

The SWRCB is responsible for ensuring compliance with the finalized Section 316(b) rules in California and it has been actively pursuing a parallel path regulatory program that is focused on the state's coastal generating stations with once-through cooling systems including DCPP. The SWRCB's *Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through-Cooling) Policy* became effective on October 1, 2010. This policy established statewide technology-based requirements to significantly reduce the adverse impacts to aquatic life from once-through- cooling. Closed-cycle wet cooling has been selected as best technology available.

Affected facilities, including DCPP, are expected to:

- Reduce intake flow (commensurate with closed-cycle wet cooling) and velocity to 0.5 feet/second (through screen) or lower– Track 1, or

- Reduce impacts to aquatic life comparably by other means – Track 2

This policy is being implemented through a so-called *adaptive management strategy*, which is intended to achieve compliance with the policy standards without disrupting the critical needs of the state's electrical generation and transmission system. A Nuclear Review Board was later established to oversee the studies, which will investigate the ability, alternatives, and costs for both SONGS and DCPP to meet the policy re-

quirements. This study is a direct outgrowth of that adaptive management strategy to implement this Once-Through Cooling Policy (Bishop, 2011).

Current Cooling Water Intake System and Section 316(b) Compliance History

DCPP operates a single cooling water intake structure to provide cooling water to Units 1 and 2. Each unit's water withdrawal rate is nominally 867,000 gpm or 1,248 mgd. Cooling water is withdrawn through a shoreline intake structure in a cove partially protected with man-made breakwaters. The inlet structure includes a set of inclined bar racks and traveling screens. A concrete curtain wall extends 7.75 feet below mean sea level to keep out floating debris. Incoming cooling water travels to one of four separate screen bays (two per unit). Each screen bay is fitted with three rotating vertical traveling screen assemblies with 3/8-inch stainless steel mesh panels. A high-pressure spray wash removes any debris or fish that have become impinged on the screen face into a sump, which leads back to the intake cove (Enercon, 2009) through a grinder. In addition, each unit has two auxiliary saltwater trains (one duty and one standby) that perform safety-related functions and each train is served with one auxiliary saltwater pump, rated at 11,000 gpm (DCPP, May 2009). The auxiliary saltwater pumps for each unit are housed in separate pump bays located near the center of the intake structure, and are serviced by a common 5-foot-wide traveling water screen.

Because of the high flow rate of the once through cooling water systems and intake velocity that exceeds 0.5 fps, the current DCPP cooling water intake structure arrangement is considered to be ineffective at reducing impingement mortality and entrainment losses. Consequently, this matter has been the subject of a number of Coastal Commission Regional Water Quality Control Board (CCRWQCB) initiatives, which have increasingly focused attention on mitigation of impingement and entrainment impacts via application of potentially viable alternative cooling system technologies.

2.3 Screening Process (A/B Criteria)

The technology screening process for the Phase I portion of the evaluation will be performed using a Criteria Set A/B approach that achieves a technically comprehensive assessment while concurrently minimizing the time and effort required. The screening will be initially performed for Set A criteria. If the technology satisfies all of the Set A criteria, it will be evaluated using Set B criteria.

Set A criteria include the following that are judged to be critical to the screening process:

- External Approval and permitting (nonnuclear licensing)
- Impingement/entrainment design
- Offsetting environmental impacts

All remaining criteria are grouped into Set B criteria, which are shown below:

- First-of-a-kind to scale
- Operability general site conditions
- Seismic and tsunami issues
- Structural
- Construction
- Maintenance

During the screening process, if any criterion cannot be met, the screening process is suspended, and a summary report for that technology is then prepared.

3. Technology Description

3.1 General Site and Intake Descriptions

3.1.1 Land and Sea Conditions

The terrestrial and marine environment including the physical oceanographic conditions at DCPP results in unique constraints affecting the practical selection of any cooling water intake system. The DCPP is located on a coastal terrace above a rocky shoreline with bathymetry characterized by a sloping bedrock bottom with steep relief, rocky pinnacles, and prominent rocky ridges. The land side topography of the DCPP site, in general, exhibits steep topographic relief where the plant itself lies on gently sloping, narrow, coastal terrace at an elevation of 85 feet (mean sea level) above the rugged coastline, with the Irish Hills rising steeply behind the facility, to the east (Tetra Tech, 2002).

The nearshore marine environment at DCPP is naturally divided into intertidal and sub-tidal zones. The ocean water level normally varies between zero and +6 feet mean lower low water datum. Mean sea level zero is equivalent to +2.6 feet mean lower low water. Maximum tidal range is approximately 9 feet and extends from 7 feet above mean lower low water to approximately 2 feet below mean lower low water. The sub-tidal zone reaches a maximum depth of approximately 60 feet below mean lower low water within 100 feet of shore in some area (DCPP, 2009).

Normal wave activity is in the 5 to 10 feet range, with storms generating waves between 20 and 30 feet. During the storm season between September 1997 and August 1998, peak swells exceeded 10 feet on 64 days. The DCPP cooling water intake is located in an area of significant production of marine algae, including surface kelp and understory algae. Kelp growth can reach two feet per day during the growing season between June and October. The DCPP is located in a "wet marine" weather environment where ocean winds are commonly 10 to 25 miles per hour and can reach 40 to 50 miles per hour. Rainfall averages 20 inches per year; and the normal daily weather pattern is characterized by wet/foggy conditions in the morning and mild to strong winds in the afternoon (Tetra Tech, 2002).

Daily mean seawater temperature ranges from approximately 10.5°C (50.9°F) in May to approximately 15°C (59°F) in September. The maximum seawater temperature is approximately 18°C (64°F) (Tetra Tech, 2002). Seawater temperature measurements at the Coastal Data Information Program observation buoy (Station 076 Diablo Canyon) moored at 0.2 nautical miles offshore of the plant indicate the same order of temperature range with the maximum and minimum values (based on measurements from 1996 to 2012 recorded at half-hourly interval) at 22°C (71.6°F) and 8.4°C (47.1°F).

3.1.2 Existing Shoreline Intake Description

DCPP uses a common shoreline intake structure to withdraw cooling water from the ocean to two independent once-through systems, one for each unit. The intake structure is protected by two breakwaters that extend offshore to form a semi-enclosed cove. Each unit is serviced by two, single-speed circulating water pumps. The cooling water flow rate for Unit 1 ranges from 778,000 to 854,000 gpm and for Unit 2 from 811,000 to 895,000 gpm. The intake structure , with the inlet oriented more or less normal to the shoreline, is furnished with inclined bar racks and travelling screens for debris filtering. A concrete curtain wall extends 7.75 feet below mean sea level to keep out floating debris. Trash bars are flat bars, 3 inches by 3/8 inches on

3-3/8 inch centers, which create 3-inch openings in the racks, designed to exclude large debris. There are six travelling screens per unit, each at 10 feet (width) x 30 feet (depth), and are equipped with stainless steel 3/8 inch mesh panel. In addition, for each unit, there are two auxiliary service water pumps housed in separate pump bays located near the center of the intake structure, and serviced by a common 5-foot-wide traveling water screen. Traveling water screens can be set to rotate at 10 or 20 feet per minute and can be washed manually or automatically, with high-pressure spray (Tetra Tech, 2002).

An additional 9-foot-wide bar rack bay serving as a fish escape route is provided at each end of the intake structure. The partition is open between the Units behind the bar racks, providing free flow of seawater and a migration route for fish from one end of the structure to the other (DCPP, 2009).

During routine operations, the traveling water screens are rotated and washed by high-pressure saltwater spray for 15 minutes every 4 hours. In high-energy ocean swell events, and/or periods of increased source water debris loading conditions, the traveling screens can be placed into continuous operation at either low or high speed. The traveling screen wash system spray nozzles discharge into sluiceways located on the intake structures exterior upper deck. The sluiceways flow to a central refuse collection sump. The sump is dewatered by pumping systems capable of transferring high percentage solids laden flow. The saltwater screen wash effluent and entrained debris is pumped from the sump to a discharge outside of the power plant intake cove. Grinding and mincing equipment installed in the inlets of the refuse sump process debris captured by the traveling screens and subsequently washed off. The debris grinders reduce potential for clogging of the sump when seawater inlet flow is laden with significant quantities of ocean debris (primarily kelp and under story algae) (DCPP, 2009).

Automatic operation of the screens occurs in one of two ways: by timed cycles or by hydrostatic pressure. Timers are typically set to initiate a 40-minute screen wash once every four hours. The screens also rotate automatically when a height differential of approximately 20 cm across the screen surface is detected. Manual operation of the traveling screens occurs whenever necessary, especially when heavy accumulations of kelp threaten the safe operation of the intake system. During these times continuous screen washing is usually necessary. In addition, for debris management, the traveling water screens drive motors are interlocked with the circulating water pump motors and if a pump is stopped, the screen drive motors in the associated bay will automatically stop. The screens are not designed to run with reverse flow.

3.2 Operational Strategies to Reduce Impingement and Entrainment

The operation strategies referred to here are the actions that will reduce the impingement and entrainment. These actions do not include major modifications to the existing cooling water system. The major modifications are addressed under other technology assessments that are the subject of other reports. Modifications related to adding fish collection and return system to traveling screens with changing screen panel to fine mesh screens are covered in the inshore mechanical fine mesh technology report and therefore they are not covered here.

The operation strategies considered fall into two main categories:

- Cooling Water Flow Rate Reduction
- Fish Deterrence Systems

3.2.1 Cooling Water Flow Rate Reduction

It is commonly accepted that the overall entrainment loss and to a certain level, impingement mortality, at an intake is strongly related to amount of water withdrawn from the source water. That is, a reduction in water withdrawal rates will likely improve the entrainment loss and associated impingement mortality proportionally. Operational conditions that could result in a reduction of cooling water flow demand include: (a) a reduction in plant load; (b) an increase in condenser temperature rise; and (c) selective flow reduction in response to temporal fluctuation of aquatic abundance in the source water (for example during fish spawning seasons).

DCPP is a base-load plant and so does not normally vary its water withdrawal rates, except during maintenance, repair, and refueling. The potential opportunity to achieve lower cooling water withdrawal rates, however, may occur during off-peak seasons when power demands are reduced.

Since DCPP is a base-loaded plant an increase in the temperature across the condensers can, in theory, reduce the total cooling water flow rate required by the system. However, there will be a corresponding increase in the discharge temperature back to the ocean, which leads to a potential increase in the thermal impacts at the outfall. Due to the sensitive nature of the response of the aquatic environment to the thermal discharge at the nearshore waters of DCPP, this operational alternative cannot be characterized as a viable strategy.

Cooling water flow rate can also be controlled selectively during periods of high biological abundance, such as fish spawning seasons to reduce entrainment losses of targeted species and life stages.

The level of flow reduction achievable, in response to a reduction in power output, depends primarily on the plant design of the steam conversion system and the cooling water system. The circulating water system for DCPP uses two single-speed pumps per unit with a flow capacity of 443,500 gpm per pump. DCPP system configuration limits the amount of flow that can be reduced, as it requires a minimum of one circulating water pump (out of two pumps) per unit to be running to supply seawater to the condensers when that unit is in operation. There is a minimum flow requirement per pump. The two pumps for each unit are physically independent of each other supplying flow to the main condenser.

Since each pump has dedicated traveling screens, the through screen flow velocity will stay the same as long as pump is operating at the rated flow. The screen through flow velocity is 1.95 fps at rated conditions, which is higher than the 0.5 fps criterion associated with the Section 316(b), *California Once-Through Cooling Policy*.

Pump flow reduction can be achieved by the throttling of downstream valves in the circulating water system. However, to reduce the through screen velocity from 1.95 fps to 0.5 fps for impingement reduction considerations, the system flow will need to be throttled down further by 75 percent. Such a reduction will not be feasible to support the plant operational needs and because the pump has to operate above its minimum flow requirement, which results in a through screen velocity higher than 0.5 fps.

It is anticipated that the implementation of the flow reduction operational strategy will introduce marginal benefits with respect to entrainment and impingement reduction, as demonstrated in Section 4.2.2.

3.2.2 Fish Deterrent Systems

A number of fish deterrent systems have been devised in an attempt to reduce the entrainment of juvenile and adult fish. However, their effectiveness is highly site, species, and time dependent. The most common types of fish deterrent system are described below:

- *i) Air Bubble Curtain* Air bubble curtains have been used at many locations in an attempt to divert or deter the movement of fish. The success of this device has been variable and appears to be affected by such factors as aquatic life species, water temperature, light intensity, water velocity, and orientation of the curtain within a water body (ASCE, 1982). The effectiveness and use of such system at DCPP requires further field studies.

- *ii) Hanging Chain Curtain* A typical hanging chain curtain might consist of a row of chains placed across the intake channel (ASCE, 1982). It acts as a fish barrier. It is a more effective in warmer water but total ineffective for colder water.

- *iii) Acoustic Fish Deterrents* There are two general types of acoustic fish deterrents: continuous wave and pulsed wave. Both of these deterrents use sound/pressure waves (noise) to influence the behavior of the fish. Acoustic fish deterrents are portable or can be mounted on stationary platforms. Because of the lack of consistent long-term performance data and the fact that their effectiveness is highly site, species and time-dependent, it is anticipated that only marginal overall improvement on entrainment reduction can be achieved with this fish deterrent systems.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 General Discussion

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals to support implementation of operational strategies to reduce impingement and entrainment.

The initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable). This applicability of each permit/approval to the proposed operational strategies option was evaluated. Those permits and approvals, which were deemed applicable, were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria, which would preclude the applicable permit or approval from ever being issued or granted. That is, the focus was to screen each applicable permit or approval for fatal flaws in the associated regulatory review process, which would preclude these operational strategies from further consideration.

The assessment also focused on identifying the critical path (longest duration) initial preimplementation permitting processes, for example, those that support site mobilization, physical site access, initial work practices for each cooling technology system option. The duration of the permitting and the approval process, while not a definitive fatal flaw, could later serve as a screening tool if combined with specific schedule limitations.

Permits and approvals, which support later stages of implementation and subsequent operation that are not critical path to the initial site activities, were also included in the assessment, since these items could pose significant operational constraints to future DCPP operations.

4.1.2 Detailed Evaluation

This summary list of permits provided the basis for subsequent discussions with key relevant regulatory authorities regarding the applicable permit application needs and the permit review time frames. These discus-

sions were also critical for the identification of potential regulatory or permit-related barriers to implementation - fatal flaws.

The following regulatory authorities wee contacted:

- U.S. Army Corps of Engineers (USACE)
- California Public Utility Commission (CPUC)
- California Coastal Commission (CCC)
- California State Lands Commission
- State Water Resources Control Board (SWRCB)
- Central Coast Regional Water Quality Control Board (CCRWQCB)
- San Luis Obispo Air Pollution Control District (APCD)
- San Luis Obispo County

The following sections discuss the relevant key permitting/approval processes for the operational strategies and summarize these findings in Table OS-1 that lists the applicable permits and approvals, determines the critical path review processes and most importantly, highlights those processes that may be fatally flawed.

4.1.2.1 Operational Strategies to Reduce Impingement and Entrainment

Operational strategies include load reduction or fish deterrent systems. Note that modifications on adding fish collection and return system and changing screen panel to fine mesh screens are covered in the inshore mechanical fine mesh technology report and therefore they are not covered here.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is the lead agency for Clean Water Act Section 404 and Section 10 permitting processes, which are focused primarily on impacts to waters of the United States and waterborne navigation. The operational strategies are not expected to pose some impacts to USACE jurisdictional waters.

For minor impacts, the USACE has established a general permit program (nationwide permit) for a host of less significant work processes involving waters of the United States. The marine work associated with this cooling system option may be a candidate for this nationwide permit permitting process. If the Nationwide process cannot support the marine work associated with the operational strategies, DCPP would then be faced with securing the more complex individual Section 404/10 permit.

While Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have goal to issue an individual Section 404 permit within 120 days of deeming the associated application complete (Lambert, 2012). This period is a goal, not a statutory commitment. Consequently, in many cases this goal is not realized. These delays are often associated with the mandated consulting processes that need to be pursued with the State Historic Preservation Office, U.S. Fish and Wildlife Service, or National Marine Fisheries Service. In other cases there are extensions of public notice periods or scheduling complications for the public hearing. The applicant for the Section 404/10 permit has to directly pursue consultations with California Coastal Commission (CCC) and SWRCB. Receipt of an individual Section 404 permit is contingent on previous receipt of permits from the CCC and SWRCB.

This difficult situation is impeded further by the under-staffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and contentious situations,

the permitting process can extend to 1 to 2 years. Hence, the USACE permits are often characterized as the critical path permitting process. Given the limited marine work associated with the operational strategies, it is unlikely that the Section 404 will represent a critical path item to the completion of permitting.

Despite the potential for review periods longer than the 120 day target, the USACE did not see any specific barriers or fatal flaws regarding the Section 404 permitting process for improvements to the intake system associated with operational strategies. (Lambert, 2012)

California Public Utility Commission

DCPP is regulated by the CPUC, which is charged with overseeing investor-owned public utilities. San Luis Obispo County may share the role of lead agency for the CEQA review process with the CPUC. CEQA is regulatory statute, which requires state or local regulatory agencies to identify, assess, avoid or otherwise mitigate the significant environmental impacts from the proposed action—the addition of new cooling system operational strategies.

The operational strategies will probably not trigger preparation of Environmental Impact Report. Instead, the CEQA review process will follow the abbreviated process, which could include development of an *Initial Study*. This will be followed either by a *Negative Declaration*, which is indicative of no adverse environmental impacts, or by a *Mitigated Negative Declaration* that follows mitigation of relatively minor negative impacts. This decision, along with other financial information, would ultimately support the process to determine if PG&E can recover the costs associated with this cooling system upgrade.

While the CPUC-sponsored environmental review process will be mostly a perfunctory affair, the follow-on decision process regarding cost recovery will be more involved and potentially contentious. Consequently, there are no clear environmental barriers that preclude completion of the CEQA review.

California Coastal Commission

The CCC has a broad mandate to protect the coastal resources of California, which includes the entire DCPP facility. Consequently, the CCC's environmental concerns address a broad range of subject matter include visual resources, land and marine-based biological resources, land use and socioeconomic concerns (for example, recreational use/access). Despite this comprehensive focus, the CCC has little in the way of specific, objective criteria, which could be used to effectively screen any of the cooling technology options from further consideration.

The CCC representatives (Detmer & Luster, 2012) indicated that the Commission recognized there were no great options to the existing once-through cooling system at DCPP. Indeed, it was indicated that almost all of the cooling system technology replacement options present some sort of negative impacts. Given that basis, the CCC may consider options that may present additional onshore impacts to help mitigate the offshore environmental consequences of the existing once-through cooling. The CCC mandate to protect the coastal resources offers this agency some latitude to balance one set of impacts versus another. This evaluation process is on a case-by-case basis, which can be translated into the conclusion that there are few triggers that would automatically preclude any of the cooling system options from consideration, including the use of operational strategies.

The CCC indicates that they are very concerned about visual impacts in the coastal zone. These operational strategies would not alter the existing profile of the DCPP facility and therefore, offer no visual resource concerns.

The strategies would involve only minor offshore construction efforts, so the CCC concerns regarding the deleterious impacts on marine resources (for example, hard marine substrate, commercial fishing) would not prove to be a decisive or contentious part of their review process.

The CCC will view marine resource protection benefits of these various strategies as wholly positive outcomes. The overall weight of these positives in their balancing of environmental impacts is somewhat reduced by the fact that Commission is not primarily charged with evaluating the cooling system's compliance with Section 3-16(b), *California Once-Through Cooling Policy*, Phase II criteria or NPDES thermal discharge considerations.

The CCC review and approval process is somewhat bound by the CEQA review process. That is, any application for a coastal development permit is dependent on information, which comes out of the CEQA-driven environmental impact report process. Given this abbreviated CEQA process for this cooling system, the CCC review process is not expected to be a contentious or critical path permitting process for these limited operational strategies.

California State Lands Commission

Construction efforts in subaqueous lands associated with any cooling system modifications will be evaluated/approved by the California State Lands Commission. This review and associated lease approval process can follow three different tracks as shown below:

- **Categorical Exemption** – applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use.

- **Mitigated Negative Declaration** - applicable for work that poses minor environmental impacts, during noncritical seasons, for limited period of time.

- **Environmental Impact Report/CEQA Process** – applicable for work that could potentially generate significant environmental impacts, uses heavy construction equipment, and/or will continue over a significant time periods (months). This review process is not fast-track and could extend for a year.

Some of the operational strategies will require only limited refashioning of the current cooling system infrastructure situated on subaqueous lands. So concerns from Commission representatives (DeLeon & Oggins, 2012) regarding the slow progress regarding recent lease approval processes for nonnuclear facility with once-through cooling systems may not be applicable. However, this assumes that the current leasing arrangement at DCPP remains in force to support the new operational strategies. Most of the nonnuclear facilities have requested extensions to continue to evaluate available mitigation strategies.

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. The operational strategies, at best will follow the *Categorical* exemption mode if evaluated at all the Commission. Consequently, the State Lands Commission lease will not represent a significant permitting hurdle for this cooling technology system.

State Water Resources Control Board - Central Coast Regional Water Quality Control Board

While the SWRCB has overall permit authority for California's two active nuclear power stations, the CCRWQCB has the follow-on inspection and enforcement role for the issue permits. For DCPP, the SWRCB expects to modify the existing NPDES permit in support of the proposed operational strategies. The lack of

significant disruption to local land surfaces is expected to negate any need for new waste discharge requirements permit for construction impacts to jurisdictional streambed areas and possibly avoid the need to seek coverage under the general storm water permit for construction activity.

The operational strategies will alter some aspects of intake operation, but it will not change the peak water withdrawal rates, nor appreciably change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor. These operational strategies may require the current DCPP NPDES permit to be revised to address the expected changes to the cooling system discharge quantity and provisions of Section 316(b), *California Once-Through Cooling Policy*, Phase II requirements. There will ostensibly be no changes to the current water treatment system since this option can be characterized as a once-through system with more robust marine resource protection measures.

Both the SWRCB and CCRWQCB representatives (Jauregui, 2012 and Von Langen, 2012) explained that there are no obvious regulatory barriers regarding issuance of a revised NPDES permit for any of the cooling system options currently under consideration, including the operational strategies. The CCRWQCB and SWRCB will not necessarily preclude cooling system options from consideration, even if these options fall short of full compliance with the performance criteria tied to Section 316(b) Phase II rules (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cooling cycle system). The operational strategies entrainment and impingement mitigation benefits are expected to fall well short of closed cycle attributes.

The SWRCB is ultimately a political body (9 individuals), whose members are interested in reviewing as much information/evidence as possible from the applicant and their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process to the implantation of operational strategies.

San Luis Obispo Air Pollution Control District (APCD)

DCPP is located within the San Luis Obispo Air Pollution Control District; a state-designated, non-attainment area for PM-10 and PM-2.5, that is, the District has failed to achieve compliance with the state ambient air quality standards for these pollutants (Willey, 2012). In addition to this air quality compliance issue, there are also local concerns regarding visibility impacts on the nearest visibility sensitive areas, so-called Class I areas that are comprised of national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence as of August 1977. While these situations may have ramifications for those cooling system options that generate significant particulate emissions (closed cooling cycle systems), air quality permits/approvals are not expected to play an appreciable role for these operational strategies—that collectively, will not generate any operational additional air emissions.

San Luis Obispo County

While most of the potential cooling systems options for DCPP will likely trigger the need for the San Luis Obispo County Planning and Building Department to initiate a conditional use permit process, which in turn will be wholly dependent on a CEQA review process there is some question as to whether any of these operational strategies will represent a sufficient trigger for the condition use permitting or CEQA process

The county recently completed a CEQA/conditional use permit review process for the DCPP steam generator replacement project (Hostetter, 2012). The county, along with the Nuclear Review Committee, were designated the lead agencies for the CEQA review. The CEQA/conditional use permit process for the steam gene-

rator replacement project, which involved significant rounds of negotiations, was characterized as complex and lengthy (years long).

While the county (Hostetter, 2012) predicted that any cooling system option with significant potential for environmental impacts would likely trigger a similar complex and lengthy CEQA/conditional use permit review process, the limited construction and operability impacts associated with replacement of essentially an internal pumping system may be viewed differently. While a CPUC-lead environmental review process would likely be a somewhat perfunctory affair, the county-driven CEQA/conditional use permit process may be pursued more aggressively to support the evaluation of alternative cooling system options—a key focus for any county-sponsored CEQA and conditional use permit review process.

If the operational strategies do not trigger preparation of an Environmental Impact Report, the county-led CEQA review process will follow the abbreviated process that could include development of *Initial Study*, followed either by a *Negative Declaration*, which is indicative of no adverse environmental impacts, or a *Mitigated Negative Declaration*, which follow mitigation of relatively minor negative impacts.

The county indicated (Hostetter, 2012) that it is unlikely that they will identify any environmental impact criteria from the CEQA review process that would immediately preclude any of the cooling system alternatives under consideration, including operational strategies to reduce impingement and entrainment. The county views the CEQA review process as the mechanism, which will ultimately identify the best solution for DCPP—all solutions will be considered.

Other Regulatory Agencies

In addition to the key regulatory agencies described above, there are a number of regulatory agencies that could potentially play a role in the permitting of the various cooling system technology options. The U.S. Fish and Wildlife Service, California Department of Fish and Game, and the California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. The operational strategies under consideration, however, entail little or no new land disturbance, which could impact sensitive biological or cultural resources, either onshore or offshore.

Implementation of these operational strategies will not alter the overall profile of the DCPP facility and certainly not require significantly tall or large construction equipment. These considerations will preclude significant interactions with California Department of Transportation (Caltrans) (roadway crossings, encroachments, oversized vehicles) and the Federal Aviation Administration (FAA) whose focus would be limited to aviation obstruction impacts posed by tall new permanent or temporary features greater than 200 feet above ground level).

Finally, the California Energy Commission (CEC) will be largely excluded from the permitting processes primarily because these strategies will not boost currently power levels of the DCPP facility, let alone reach the 50 MW thresholds, which would mandate CEC review.

4.1.2.2 Summary

The external approval and permitting assessment for the operational strategies identified a rather short list of potentially applicable federal, state and local permits and approvals. This result was expected given the obvious limited nature of the construction work associated with these strategies and the likewise marginal difference in cooling system operations when compared with current practices.

The only substantive permits or approvals that will potentially apply to this cooling water option are the county-led CEQA process and an amendment to the existing NPDES permit. Both the CEQA review and NPDES amendment processes are not expected to be contentious or lengthy. While this cooling system option may provide only limited improvements relative to California Once-Through Cooling Policy Section 316(b) Phase II performance expectations for impingement and entrainment, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria, which would preclude this option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process, which would preclude the operational strategies to reduce impingement and entrainment from further consideration.

The assessment also indicated that the county-sponsored CEQA review process (6 to 12 months) is forecast to be somewhat longer than the related impacts would dictate because of the county's interest in having a robust alternative cooling system review process. The duration of this critical path process, however, will not represent a barrier to development of this cooling technology system.

4.2 Impingement/Entrainment Design

4.2.1 General Discussions

As described in Section 3.2, there are limited operational strategies available, namely cooling water flow rate reduction, and fish deterrent systems. However, as described below, none of these strategies would suffice in meeting Section 316(b), *California Once-Through Cooling Policy*, Phase II.

4.2.2 Detailed Evaluations

The detailed evaluations of the design features of the identified operation strategies are as follows:

Cooling Water Flow Rate Reduction

DCPP is a base-load plant and normally does not vary its cooling water circulating flow (or water withdrawal rate), except during maintenance, repair and refueling. The potential opportunity to achieve lower cooling water withdrawal rates may occur during off peak seasons when power demands are lower, however, this period may not coincide with the fish spawning season.

Flow reduction capability is limited by DCPP circulating water system equipment and operating constraints that consist of the following: a) single-speed cooling water pumps need to operate above their minimum continuous flow rated design, b) a minimum number of operating pumps are required (one per unit) to supply cooling water to the condensers, and c) there are limitations on the ability of valve throttling to reduce flow. These constraints will limit the ability of the system to reduce flow and lower impingement and entrainment losses proportionally to an acceptable level commensurate with the Section 316(b), *California Once-Through Cooling Policy* requirements.

The required through screens velocity of 0.5 fps cannot be achieved with the one pump out of two (per unit) operating mode. Since each pump is served by its own screens, shutting one pump down will likely cause the other pump to run out and result in even higher through screen velocity than 1.95 fps. For the rated flow, the through screen velocity of 1.95 is almost four times higher than the required through screen velocity of 0.5 fps. Downstream valve throttling is required to bring the operating pump flows to even lower limits, but the throttling of valves may not be acceptable due to their size and potential for cavitation and the flow required

to support power generation of the power plant. In addition, the pump minimum flow requirements must be met and this flow is high for such size pumps, which limits the level of flow reduction that can be achieved.

DCPP is base-load plant and consequently it is designed to operate at full capacity, except during maintenance, repair and refueling. Some benefits of the cooling water flow reduction may be attained by reducing load generation during off peak seasons when power demands are lower. However, it is not expected that the off-peak season load reduction and the corresponding attainable reduction in entrainment loss and impingement mortality will reach a level commensurate with that of a closed cycle wet cooling system. Further, according to a TENERA field study from late 1996 to mid-1998 (TENERA, 2000), the density of some of the sixteen larval fish taxa collected at the DCPP intake was typically higher in late winter and spring months, while others such as snailfishes, sanddads, speckled sanddads and pacific sanddads peak in the summer months. The varying seasonality in the density of different larval fish suggests that not all organisms would benefit equally from the load reduction to achieve flow reduction during off peak seasons.

Fish-Deterrent Systems

Fish-deterrent systems, such as acoustic systems, air bubble curtains or hanging chain curtains, are highly site and species dependent and they only can deter adult fish. They will not reduce entrainment of fish egg and larvae. Hanging chain barriers testing has indicated this technology was moderately successful in warm water, but totally ineffective in cold water. Thus, this system is not expected to be effective in the cool ocean waters at DCPP.

Acoustic fish deterrents schemes, both the continuous wave and pulsed wave deterrents, use sound/pressure waves (noise) to influence the behavior and can injure aquatic organisms. These systems can be lethal if the organism is close to the source of the pressure wave. Underwater ensonification affects fish by using either a sudden burst or a continuous resonant sound wave, both of which can create disturbances within air-filled cavities within the fish that can lead to tissue damage. Fish species that have a swim bladder are the most vulnerable to underwater sound. The swim bladder is an internal organ used to maintain a normal upright position in water. Additionally the acoustic fish deterrent technology is ineffective for the reduction of egg and larvae. Given these features and impacts acoustic fish deterrent systems are not recommended for application at DCPP.

In summary, implementation of the operational strategies, as described above, will not result in sufficient improvements in impingement mortality and entrainment reduction at DCPP. Therefore, this technology alone does not satisfy the impingement and entrainment criteria prescribed by Section 316(b), *California Once-Through Cooling Policy*, Phase II Rules.

4.3 Environmental Offsets

4.3.1 General Discussion

The environmental offsets are an environmental management tool, which has been characterized as the “last line of defense” after attempts to mitigate the environmental impacts of an activity are considered and exhausted (GWA, 2006). In some cases significant unavoidable adverse environmental impacts may be counterbalanced by some associated positive environmental gains. Environmental offsets, however, are not a project negotiation tool, that is, they do not preclude the need to meet all applicable statutory requirements and they cannot make otherwise “unacceptable” adverse environmental impacts acceptable within the applicable regulatory agency.

In some cases, regulatory agencies may be so constrained by their regulatory foundation that offset opportunities are limited or unavailable. The San Luis Obispo APCD, for example, has the regulatory authority to offset new air emissions in their district from previously banked emission reductions as long as the new emission sources meet appropriate stringent emission performance criteria. The APCD cannot offset new air emissions with reductions in the impingement and entrainment impacts to aquatic life or reductions in land disturbance. In other cases, the regulatory agencies, such as the California Coastal and State Lands Commissions, have a more broadly based, multidisciplinary review process, which supports a more flexible approach to using environmental offsets to generate the maximum net environmental benefit.

With these considerations in mind, the following assessment of offsetting environmental impacts focuses on identifying both positive and negative construction and operational environmental impacts associated with the construction and operation of operational strategies system from a broad range of environmental evaluation criteria.

4.3.2 Detailed Discussion

The following sections evaluate the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic issues associated with construction and operation of the operational strategies system. Given the wide range of environmental impact subject areas under consideration, the systematic approach used in the Diablo Canyon License Renewable Application process was used (PG&E, 2009). Consequently, following discussion of the individual environmental subject areas, the related consequences are categorized as having either positive or negative small, moderate or large impact significance. The specific criteria for this categorization are shown below:

- **Small:** Environmental effects are not detectable or are minor such they will not noticeably alter any important attribute of the resource

- **Moderate:** Environmental effects are sufficient to noticeably alter, but not significantly change, the attributes of the resource.

- **Large:** Environmental effects are clearly noticeable and are sufficient to change the attributes of the resource.

The results of these evaluations and impact categorization are subsequently summarized in the Table OS-1.

Air

The air quality impacts associated with the implementation of operational strategies are small given that the limited nature of the associated construction activities. There will be little or no opportunity to generate fugitive dust from land disturbance activities, as the primary activity will involve activities that involve limited construction and no new operational air emission sources. Some additional vehicle-related air emissions can be expected from the small number of outage workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment will be unnecessary. Construction supplies and pumping equipment deliveries will be minimal. Most of the remaining construction equipment inventory will likely use existing onsite electrical power, avoiding the need for diesel powered equipment. There is little or no impact to construction air resources from this cooling technology option.

The operational strategies will not appreciably impact the DCPP overall plant efficiency, so they are not expected to encourage or discourage the generation of additional greenhouse gas emissions from replacement fossil power sources. Consequently, there is little or no operational air quality impacts from these strategies.

Surface Water

Given the limited nature of the construction needed to implement operational strategies system, no significant additional surface water resources will be needed and there be little or no new land disturbance, which could potentially generate storm water impacts.

The various operational strategies do not have an appreciable impact on the surface water withdrawal rates and so are not expected to any appreciable marine life benefits that could be tied direct to reductions in cooling water circulation water intake rates and cooling water blowdown rates. Consequently, there is little or no operational surface water impacts from these strategies.

Groundwater

Given the limited nature of the construction need to implement the operational strategies system, no significant additional groundwater resources will be needed.

The operational strategies systems are not expected to require any additional groundwater resources.

Waste

Constructions-related waste, including recyclable metals from any related alterations of the previous cooling water pumping system, will be generated. Consequently, most of the construction wastes will have salvage value and therefore, not represent a burden to offsite disposal facilities.

Operation of the operational strategies system could in some cases generate additional marine resource wastes in response to better or more effective screening operations. These wastes are not expected to be appreciable.

Noise

Previous studies have concluded from consultations with the County of San Luis Obispo that noise levels are expected not to exceed 70 dBA at the property boundary of the affected area (Tetra Tech, 2008). Noise levels from implementation activities for these operational strategies will be largely unchanged, since the related construction work is limited.

Operational noise levels are expected to be largely unchanged as a result of these operational strategies.

Land Use

Construction activities associated with operational strategies system are largely confined to previously disturbance lands and existing structures. Consequently, there are no changes in land use during construction.

The revised screening systems or related systems will occupy areas that already contain similar equipment, so there are no permanent changes in land use with this option.

Marine Ecological Resources

Construction activities associated with these operational strategies are confined to the previously developed nearshore and onshore areas. Consequently, implementation of these strategies will not disturb appreciable areas of previously undisturbed marine habitat.

Most of the operational strategies attempt to screen out, retrieve and return aquatic life to their natural habitat offer some benefits regarding the reduction of impingement and entrainment-related marine life losses. This positive benefit has to be characterized as small, because these systems fail to appreciably reduce the through screen intake velocity and/or reduce cooling water intake and the related entrainment losses.

Terrestrial Ecological Resources

Construction activities associated with the addition of these operational strategies are confined to the previously developed land areas. There will be no construction impacts to natural habitat areas or areas with significant ecological value or sensitivity. These operational strategies in action will pose no threat to these resource areas.

Cultural and Paleontological Resources

Since implementation of these operational strategies will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas. These operational strategies in action will similarly pose no threat to cultural or paleontological resources.

Visual Resources

All related construction equipment will be low profile, that is, the construction support features and equipment will not extend above the height of local facility structures.

The operational strategies will be contained within the confined of the developed near or inshore areas and present no permanent change in external profile of the facility.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries are not expected to appreciably worsen the existing level of service on local roads during the plant outage to implement these strategies. If this construction activity is aligned with a large scope plant outage activity, its incremental impact relative to other plant upgrade activities will likely make its contribution to local traffic levels negligible.

The operational strategies will not appreciably alter the number of plant-related deliveries or operating commuting personnel.

Socioeconomic Issues

While there will be some additional construction-related employment opportunities with this technology option, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).

Maintenance staff requirements may increase in a minor way in response to these operational strategies.

4.3.3 Summary

Table OS-2 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets regarding implementation of the operational strategies. The construction impacts related to the fish deterrent system could be characterized as having small negative impact significance, because of the minor increase in construction phase air emissions and wastes. Theses impacts are not offset by the limited employment opportunities that may be gained during this same period. Operationally, there is a small positive impact significance related to the operational strategies improved ability to screen out, retrieve and return aquatic life to their natural environment. Viewed collectively, the pattern of environmental impact significance ratings suggest that implementation of operational strategies system may offer an overall weak net-positive environmental benefit.

4.4 First-of-a-Kind

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.5 Operability General Site Conditions

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.6 Seismic and Tsunami Issues

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.7 Structural

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.8 Construction

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.9 Maintenance

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

5. Conclusion

As described in Section 4.2, the available operational strategies to reduce impingement and entrainment impacts in the existing DCPP cooling water system are very limited and their use alone would not reduce entrainment or impingement mortality (a Set A criterion) at the DCPP intake to a level commensurate that the Section 316(b), *California Once Through Cooling Policy*, Phase II rules. Consequently, this option should not be candidate for further evaluation in the next phase of the assessment.

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Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the implementation of operational strategies does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers (USACE)	Implementation of some of the operational strategies could impact impacts to waters of U.S.. and could lead to the need for an individual form of the permit.	120 days from complete application (goal) ~12 months (expected)	No	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers (USACE) & Regional Quality Control Board (RWQCB)	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	NA
Nationwide Permit – U.S. Army Corps of Engineers	The implementation of operational strategies could generate modest impacts to waters of the U.S., which could potentially be addressed by the Nationwide permitting process.	1-3 months	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable - the implementation of operational strategies not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA)	Not applicable - the implementation of operational strategies will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable - the implementation of operational strategies will not demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Not applicable – the implementation of operational strategies will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
California Public Utility Commission (CPUC) Approval	CPUC may share the lead agency for the CEQA with the county. The CEQA review process could include preparation of an Initial Study (IS), followed either by a Negative Declaration (ND) or a Mitigated Negative Declaration (MND). Alternatively, the county could influence the CEQA process to follow the EIR route to encourage the alternative review of various cooling system options. This decision from this process will, regardless, be involved with Pacific Gas & Electric efforts to recover the costs associated with the operational strategies.	6 - 12 months nominally	Potential	No
California Energy Commission (CEC) – Final Decision	Not applicable – the implementation of operational strategies will not result in a net power capacity (increase) > 50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Not applicable - the operational strategies will not demand any appreciable additional land, nor involve any exterior changes to existing structures in the Coastal Zone.	Not applicable	NA	NA
Coastal Development Lease – California State Lands Commission	The operational strategies system will involve some limited work in the marine environment.	Connected to CEQA (~9 months)	Potential	No
Regional Pollution Control District Authority to Construct (ATC) – San Luis Obispo Regional Air Pollution Control District	Not applicable - the strategies will not generate any significant additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTO) – San Luis Obispo Air Pollution Control District	Not applicable - the strategies will not generate any significant additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - the strategies will not generate any significant additional operational acid rain-related air emissions.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Title IV Acid Rain Permit - USEPA	Not applicable - the operational strategies will not generate any significant additional acid rain-related air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces and so will not generate any significant supplemental dust emissions. The strategies themselves, in operation, will not generate any additional dust emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board (CCRWQCB) and State Water Resources Control Board	The operational strategies will alter some aspects of intake operation, but it will not change the peak water withdrawal rates, nor appreciably change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board (RWQCB)	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from the implementation of operational strategies.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Department of Fish & Game (CDFG)	Not applicable - the implementation of operational strategies will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game (CDFG)	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements (WDR) – Central Coast Regional Water Quality Control Board	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation (OHP)	Not applicable - the operational strategies will not demand any additional land nor disturb any previously undisturbed surface.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environmental Health Services - California Unified Program Agency	Implementation of the operational strategies could potentially require an ID number to support management or construction wastes, unless current DCPP ID will be used.	1-2 weeks	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environmental Health Services - California Unified Program Agency	Not applicable – the implementation of operational strategies will allow for the continuing use of the existing hazardous waste ID number. There will be not impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the implementation of the operational strategies is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit – San Luis Obispo County Department of Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the implementation of the operational strategies is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the implementation of the operational strategies will not require the addition of any new volatile chemicals.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the implementation of the operational strategies is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Luis Obispo County Department of Planning and Building	Not applicable – the implementation of the operational strategies can be characterized as an internal improvement conducted wholly within or adjacent to existing structures.	Not applicable	NA	NA
Conditional Use Plan Amendment – San Luis Obispo County Department of Planning and Building	Not applicable - while the scope of work associated implementation of these strategies may not be an obvious trigger, it is possible that need to evaluate alternative cooling systems could trigger the need for an amendment to the existing Conditional Use Permit.	Not applicable	NA	NA
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Not applicable – there will be no grading during implementation of the operational strategies.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Luis Obispo Department of Public Works	Not applicable - similar to the construction-phase SWPPP. No separate submittal is expected to be directed to the county.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Luis Department of Planning and Building	Not applicable - the addition of the operational strategies may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) –San Luis County Environmental Health Services	Not applicable – no new potable water systems are planned.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit – San Luis Obispo County Environmental Health Services	Not applicable – no new wells to be developed.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	No applicable – the equipment related to the operational strategies will probably not prove to be oversized.	Not applicable.	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	No applicable – the equipment related to the operational strategies will probably not prove to be oversized.	Not applicable	NA	NA
Resource Conservation (RC) Land Use Management Approval	Not applicable - while local municipality rules may supersede this regional land use//watershed protection-related project approval process, this is not the case for DCPP.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the implementation of the operational strategies is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	The implementation of the operational strategies may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan.	No	No
Sewer and Sewer Connections – San Luis Obispo County Environmental Health Services	Not applicable - no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the implementation of the operational strategies will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table OS-2.
Offsetting Impacts for the Operational Strategies
Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NOx, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the plant outage to implement the operational strategies.	The operational strategies will not result in any significant changes to plant efficiency and so no significant changes in overall air quality impacts are expected during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from commuting traffic during associated plant outages.	Small Negative	None
Surface Water	No surface water impacts during construction either supplemental consumptive uses or storm water-related impacts.	The strategies will not alter the water withdrawal intake rate or cooling water discharge rate.	Not applicable	None	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support these operational strategies.	Not applicable	None	None
Waste	Constructions-related waste will be generated during the outage to implement these strategies. Most of these wastes will be recyclable metal that will not impact offsite disposal facilities.	There may be a minor increase in waste generation during operation from the improved screening operations.	Insignificant temporary increase in construction wastes and some metal recyclables.	Small Negative	None

Table OS-2.
Offsetting Impacts for the Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Noise levels from construction will be largely unchanged, since the primary work areas will be limited to inshore or nearshore areas that house existing equipment.	Operational noise levels are expected to be largely unchanged as a result of the new pumping system.	None	None	None
Land Use	Related construction activities are largely confined to previously disturbance onshore land and subaqueous land.	The strategies primarily occupy areas with existing marine-based equipment, so there are no permanent changes in land use.	None	None	None
Marine Ecological Resources	Construction activities are confined to the previously developed nearshore and onshore areas. There is limited potential to impact previously undisturbed marine habitat.	The improved screening operations and attempts to retrieve and return aquatic life to their natural marine habitat offer some benefits. These strategies fail to appreciable reduce the through screen intake velocity and/or reduce cooling water intake and the related entrainment losses.	None	None	Small Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	None	None	None

Table OS-2.
Offsetting Impacts for the Operational Strategies
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed onshore and nearshore land, there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of cultural or paleontological resources.	None	None	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The operational strategies will not result in any permanent change in external profile of the facility.	None	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The operational strategies will not significantly alter the current number of plant deliveries or operating commuting personnel.	Level of Service Impacts (pending subsequent assessment phase)	Small Negative	None
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the operational strategies.	Employment Levels (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact of Significance
Small: Environmental effects are not detectable or are minor such they will not noticeably alter any important attribute of the resource
Moderate: Environmental effects are sufficient to noticeably alter, but not significantly change the attributes of the resource.
Large: Environmental effects are clearly noticeable and are sufficient to change the attributes of the resource.