Prepared for

PG&E and the
State Water Resources Control Board
Nuclear Review Committee

Independent Third-Party Interim Technical Assessment

for the

Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling System for Diablo Canyon Power Plant

Prepared by BECHTEL Bechtel Power Corporation

Report No. 25762-000-30R-G01G-00009 Rev. 2

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Revision	Date	Affected Sections
0	September 14, 2012	Initial Issue
1	October 12, 2012	Correct several Formatting issues and provide additional details in the TOC Sections 3.2.2.2, 3.6.2, 3.6.5, 3.8, 3.8.3, 4.1.1.2, 4.1.2, 4.1.2.1, 4.2.5 4.2.8, and Section 6
2	November 5, 2012	Incorporated Review Committee Comment in Sections 3.1.3, 3.5, 3.6.2, 4.2.4, and 4.2.5

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List of Abbreviations and Acronyms

agl	above ground level
APCD	Air Pollution Control District
ASCE	American Society of Civil Engineers
ATC	Authority to Construct (Air Pollution Control District)
BLM	Bureau of Land Management
BTA	Best Technology Available
Caltrans	California Department of Transportation
CC	closed-cycle (figure and table number prefix)
CCRWQCB	Central Coast Regional Water Quality Control Board
CCC	California Coastal Commission
CCS	closed-cycle system
CDFG	California Department of Fish & Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
DCPP	Diablo Canyon Power Plant
DW	deepwater *(figure and table number prefix)*
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPCRA	Emergency Planning and Community Right-To-Know Act
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
fps	foot per second
gpm	gallons per minute
GWA	Government of Western Australia
IFMS	inshore fine mesh screen *(figure and table number prefix)*
IR	intake relocation *(figure and table number prefix)*
IS	Initial Study
JUOTC	Joint Utilities Once-Through Cooling
mgd	million gallons per day
MND	Mitigated Negative Declaration
ND	Negative Declaration
NEPA	National Environmental Policy Act
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
OHP	Office of Historic Preservation
OS	operating strategies *(figure and table number prefix)*
PG&E	Pacific Gas & Electric
PTO	Permit to Operate (Air Pollution Control District)
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 Control Board
SWS	source water substrate *(figure and table number prefix)*
USACE	U.S. Army Corps of Engineers

List of Abbreviations *(cont.)*

USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compounds
VS	variable speed *(figure and table number prefix)*
WDR	Waste Discharge Requirement
WW	Wedge Wire

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1. Executive Summary

This final report describes the findings of the first phase of an assessment of the viability of the technologies noted in the *Scope of Work Report by the Review Committee to oversee Special Studies for the Nuclear-Fueled Power Plants Using Once-through Cooling* dated November 7, 2011 for the Diablo Canyon Power Plant (DCPP) in support of the Nuclear Review Committee's (Committee) initiative to identify strategies to implement the California *Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*. This strategy would comply with the *California Once-Through-Cooling Policy.*

The technologies defined in the Scope of Work that have been evaluated are:

- Closed-Cycle Cooling Systems
- Deepwater Offshore Intake
- Initial Intake Relocation
- Inshore Mechanical (Active) Intake Fine Mesh Screening Systems
- Offshore Modular Wedge Wire
- Operational Strategies to Reduce Impingement and Entrainment
- Source Water Substrate Filtering/Collection Systems
- Variable Speed Cooling Water Pumping Systems

The evaluation process used for this first phase was to review each of the technologies without regard for cost against the Nuclear Review Committee Evaluation Criteria mandated by the Scope of Work document. These criteria are:

- First-of-a-Kind to Scale
- External Approval and Permitting (Nonnuclear Licensing)
- Operability General Site Conditions
- Impingement/Entrainment Design
- Offsetting Environmental Impacts
- Seismic and Tsunami Issues
- Structural
- Construction
- Maintenance

A detailed review of each of the technologies against each of the criteria for DCPP has been completed. The evaluation is documented in a detail in this Phase 1 final report. If a technology was determined to be technically feasible for the DCPP site based on a criterion review, the reason is clearly annotated. Once a given technology was determined to not be feasible, it was considered screened out and no further work was done on that technology. Figure 1-1 presents a work flow diagram of the approach used to complete the Phase 1 work.

Once a technology was screened for the DCPP site, an interim report was developed that detailed the results for that technology. The interim report included a tabular listing of all of the criteria evaluated with a corresponding determination of either feasible, not-feasible, or not evaluated. The interim reports were submitted to the utility and the Nuclear Review Board for review and concurrence. Comments from the reviewers led to a limited amount of additional investigation, in particular regarding availability of water sources for the closed-cycle cooling technologies, and refinement of some of the findings discussions.

All of the technologies have been reviewed against each of the Phase 1 review criterion and this final report addresses the feasibility of each of the technologies evaluated for DCPP. The report includes detailed write-ups related to the determinations made during the investigation, and includes resolved comments that have been received relating to the interim reports submitted during the review process and a listing of all references used for the Phase 1 study.

The Phase 1 study concluded that the following technologies are not feasible for DCPP:

- Wet Cooling Using Seawater for Makeup in Closed-Cycle Cooling Systems Deepwater Offshore Intake
- Operational Strategies to Reduce Impingement and Entrainment
- Source Water Substrate Filtering/Collection Systems
- Variable Speed Cooling Water Pumping Systems

The following technologies were determined technically feasible for DCPP subject to the completion of the Phase 2 follow on study:

- Closed-Cycle Cooling Systems (except for wet cooling using seawater for makeup)
- Initial Intake Relocation
- Inshore Mechanical (active) Intake Fine Mesh Screening Systems
- Offshore Modular Wedge Wire

Table 1-1 presents a summary of the criteria evaluation for each technology that forms the bases of the conclusion reached. The details of the reviews of each technology are presented throughout this report. In general, the technologies that were found to be not feasible were rejected due to their inability to substantially improve the impingement and/or entrainment characteristics of the intake or, in the case of the closed cooling water technology using saltwater makeup, the inability to permit the technology due to the lack of available PM-10 offsets (salt-related emissions from drift) that would be necessary for granting an air emissions permit.

The evaluations looked only at the technical feasibility of each technology's application at DCPP, without consideration of costs, in accordance with the report requirements defined by the State Water Resources Control Board (SWRCB) and PG&E. It is recognized that imposition of costs may render a technically feasible approach impractical or unreasonable. A more detailed evaluation of which technology/variation is optimum for DCPP, including estimated costs, will be carried out in Phase 2 of this study.

The engineering assessment reviewed the technologies for limitations imposed by the laws of physics, engineering methods, or simple space requirements. While application of some of the technologies may prove complex, challenging, and costly, the technical capability exists.

Although the Phase 1 studies found that the intake relocation technology was feasible, the Nuclear Review Committee, after reviewing the findings of the interim report, made the determination that the intake impingement and entrainment characteristics would not be sufficiently improved to warrant that technology being studied in Phase 2.

The external approval and permitting assessment identified a list of potentially applicable federal, state, and local permits and approvals. The efforts to conduct a successful California Environmental Quality Act (CEQA) review and secure the U.S. Army Corps of Engineers (USACE) Section 404 permit, the California Coastal Commission (CCC) coastal development permit, State Lands Commission Lease, and the National Pollutant Discharge Elimination System (NPDES) permit modification will represent the primary regulatory challenges.

These related permit processes are all expected to be challenging and lengthy, as they will be aligned with the comprehensive CEQA/Environmental Impact Report (EIR) review process. The primary issue of concern will be evaluating the construction impacts to the sensitive and productive marine habitats associated with the once-through cooling technologies and the land and usage, visual and plant electrical power output impacts associated with the closed cooling cycle operations against further reductions in impingement impacts that are already partially mitigated by the existing intake system.

The overall finding for technologies that have been found to be feasible is that although they have been found to be feasible, several significant technical and operational challenges associated with each of the technologies. Those key challenges center on determining the optimum screen and slot sizes to gain the optimum effectiveness in reducing fish egg and larvae entrainment for the once-through cooling, identifying the supply source(s) for makeup water and optimizing the land usage for the closed cooling water options, and managing a permitting process that will be lengthy, complex, and challenging. These issues will be addressed in detail during Phase 2.

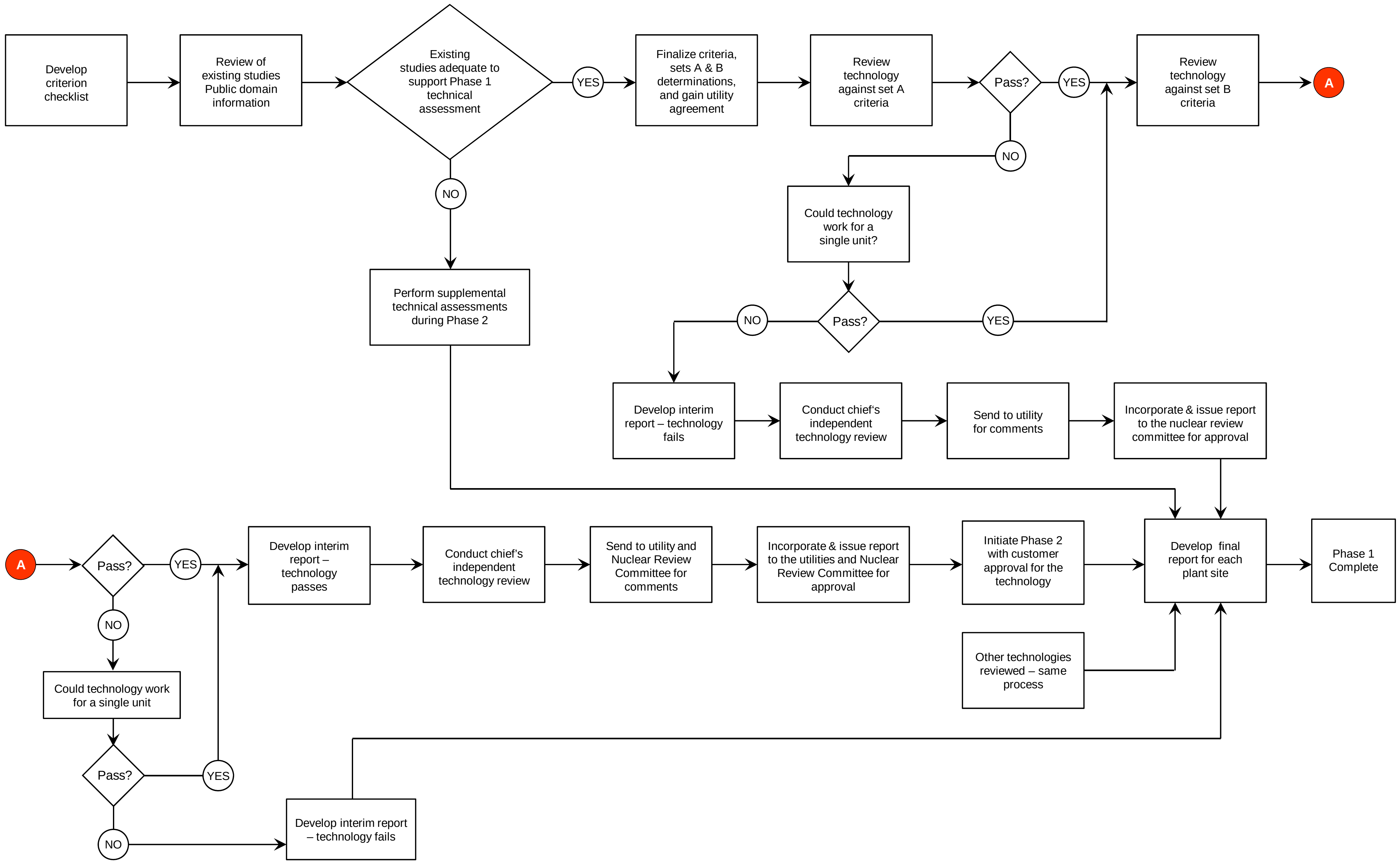


Figure 1-1. *Phase 1 Review Process for Each Technology*

Table 1-1
Overall Conclusions

CRITERIA	STATUS										
Technology	**Passive Draft Dry/Air Cooling**	**Mechanical (Forced) Draft Dry/Air Cooling**	**Wet Natural Draft Cooling**	**Wet Mechanical (Forced) Draft Cooling**	**Hybrid Wet/Dry Cooling**	**Deepwater Offshore Intake**	**Initial Intake Relocation**	**Inshore Mechanical (Active) Intake Fine Mesh Screening Systems**	**Offshore Modular Wedge Wire or Similar Exclusion Screening Systems**	**Operational Strategies to Reduce Impingement and Entrainment**	**Source Water Substrate Filtering/Collection Systems**	**Variable Speed Cooling Water Pumping Systems**
External Approval and Permitting	No fatal flaws.	No fatal flaws.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/freshwater towers.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/freshwater towers.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/freshwater towers.	No fatal flaws	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.
Impingement/Entrainment Design	Satisfies *California Once-Through Cooling Policy* criteria requirements.	Satisfies California *Once-Through Cooling Policy* Criteria requirements.	Satisfies *California Once-Through Cooling Policy* criteria requirements.	Satisfies *California Once-Through Cooling Policy* criteria requirements.	Satisfies *California Once-Through Cooling Policy* criteria requirements.	Studies have shown that the entrainment will unlikely be improved for this design, so this is considered not to be viable.	No fatal flaws but the technology's effectiveness with entrainment of fish eggs and larvae is indeterminate.	No fatal flaws, but need to replace the existing screens with dual flow-type traveling screens with fine mesh panels, and fish collection and return systems.	No fatal flaws, but the technology's effectiveness regarding entrainment impact mitigation needs better characterization.	Cannot satisfy *California Once-Through Cooling Policy* criteria requirements.	No fatal flaws.	Cannot satisfy California *Once-Through Cooling Policy* Criteria Requirements.
Environmental Offsets	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Weak overall net positive benefit.	No fatal flaws.	Weak overall net positive benefit.
First-of-Kind-to-Scale	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Fatal flaw – the use of this technology for a water supply system of this size has not been used and is impractical.	Not evaluated.
Operability of General Site Conditions	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Low reliability and ever-decreasing lateral efficiency makes this technology a fatal flaw.	Not evaluated.
Seismic and Tsunami Issues	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	Not evaluated.
Structure and Construction	No fatal flaws based on the assumption that additional land adjacent to the Owner-controlled area can be acquired as necessary to accommodate tower placement.	No fatal flaws based on the assumption that additional land adjacent to the Owner-acquired as necessary to accommodate tower placement.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	Not evaluated.
Maintenance	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	No practical maintenance program causes it to be a fatal flaw.	Not evaluated.
Conclusion	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**

Note: Environmental Offsets refers to broad environmental subject matter – not the specific air emission offsets addressed in the External Approval and Permitting Criterion

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 *Water Quality Control Policy Use of Coastal and Estuarine Waters for Power Plant Cooling*, which established uniform, technology-based standards to implement the Clean Water Act Section 316(b) that mandates the 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 eight alternative technologies to once-through cooling for DCPP based on the list of site-specific criteria approved by the Nuclear Review Committee. The technologies evaluated were:

- Closed-Cycle Cooling Systems
- Deepwater Offshore Intake
- Initial Intake Relocation
- Inshore Mechanical (Active) Intake Fine Mesh Screening Systems
- Offshore Modular Wedge Wire
- Operational Strategies to Reduce Impingement and Entrainment
- Source Water Substrate Filtering/Collection Systems
- Variable Speed Cooling Water Pumping Systems

These technologies are described in detail in Section 3. The evaluation process includes critical review of published data and literature, consultation with permitting agencies, and technical assessment supported by engineering experience and judgment. Engineering definitions were defined for each of the technologies studied and conceptual design information was used to perform the criteria review for each. This included developing differential operating requirements for each technology option and identifying and compiling their industry experience, reliability, and uncertainties. No new field data was collected as part of this effort. The results of the evaluation are used to characterize the feasibility of the technology and its possible selection as a candidate for further investigation in a follow-up 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 to 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 that remove or otherwise impact significant quantities of aquatic organisms present in the waters of the United States. Most of the impacts are to early life stages of fish and shellfish 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, again 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) were 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 at least 25 percent of their water from an adjacent water body for cooling purposes and have a design intake flow range of 2 million gallons per day (mgd) 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 per second (fps) (through-screen) or below, which would allow most fish to avoid impingement.

Large power plants (water withdraw rates greater than 125 mgd) would also be required to conduct studies to help their local permitting authorities (SWRCB) determine what site-specific controls (if any) would be required to reduce entrainment mortality impacts. Note this version abandoned the original performance standards approach that mandated the calculation of baseline values against which reduction in entrainment and impingement can be measured.

The Section 316(b) Phase II final rule was scheduled to be issued on July 27, 2012, but the USEPA has secured an additional year to finalize standards for cooling water intake structures. The USEPA is working to finalize those standards by June 27, 2013. When the final rule become effective, it is likely to include an implementation timeline that 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 *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant 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 the *Best Technology Available*.

Affected facilities, including DCPP, are expected to:

- Reduce intake flow (commensurate with closed-cycle wet cooling) and velocity to 0.5 fps (through-screen) or below – 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* that 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 Committee was later established to oversee the studies that will investigate the ability, alternatives, and costs for DCPP to meet the policy requirements. This study is a direct outgrowth of the adaptive management strategy to implement this *California 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 gallons per minute (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 that leads back to the intake cove (Tetra Tech, 2008). 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, 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.

Though the intake velocities associated with the main circulating water pumps are in excess of 0.5 fps. However, the impingement losses at DCPP are considered by the Central Coast Regional Water Quality Control Board (CCRWQCB) to be minor and so do not apparently justify further efforts to reduce these losses. Consequently, the Board's continuing concerns are limited to entrainment impacts. The CCRWQCB investigation of cooling water technology alternatives is expected to be focused on the reduction of entrainment losses, since the impingement losses appear to be already minimized.

2.3 Screening Process (A/B Criteria)

The technology screening process for the Phase 1 portion of the evaluation will be performed using a two-tier criteria (Criteria Set A/B) approach that achieves a technically comprehensive assessment while 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 the Set B criteria.

Set A includes the following criteria that are critical to the screening process:

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

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

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

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

3. Technology Description

3.1 Existing Conditions and Shoreline Intake Description at DCPP

3.1.1 Land and Sea Conditions

The terrestrial and marine environment, including the physical oceanographic conditions at DCPP, results in unique constraints that affect the practical selection of any cooling water intake system. 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 near DCPP is naturally divided into intertidal and subtidal 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 subtidal 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–foot 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. 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 intervals) 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 safety-related auxiliary saltwater 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. One auxiliary saltwater pump per unit must remain operational at all times. 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 solid-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 to process debris captured by the traveling screens and subsequently washed off. The debris grinders reduce the 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).

The screens also rotate automatically when a height differential of approximately 20 centimeters 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.

3.1.3 Summary of DCPP License Renewal Environmental Report on Impingement and Entrainment

Sections 4.2 and 4.3 of the DCPP License Renewal Environment Report, Appendix E (DCPP, 2009) evaluate entrainment and impingement impacts to fish and shellfish in early life stages. Supporting information is offered by the *Diablo Canyon Power Plant Cooling Section 316(b) Demonstration Report*, prepared by Tenera Environmental Services (Tenera, 2000) and the DCPP technical data report on impingement of fish and shellfish (PG&E, 2009).

Section 4.2.3 of the DCPP report indicated that the DCPP 'take' on average was approximately 11 percent of the larval population susceptible to entrainment. Considering the volume of water circulated through DCPP, this results in significant absolute number of fish and shellfish larvae lost when the 100 percent administrative mortality estimate is applied. Annual entrainment of larval fish is estimated to range between 1.48 and 1.77 billion, depending on water withdrawal. Though the absolute numbers are large, PG&E contends that the natural survival rate for eggs and larvae to juvenile stages is generally less than 1 percent, and survivorship to adult stage for most species is far less than 1 percent. Given this, the DCPP report considers the larval population loss to be insignificant. The CCRWQCB, however, determined that the loss of larval organisms alone may constitute an adverse impact, and they also concluded that "Regarding entrainment of larvae in the cooling water system, the proportional loss of larvae is significant. However, the costs of DCPP modification or operational changes are wholly disproportionate to the benefit to be gained."(PG&E, 2009).

PG&E concludes (PG&E, 2009) that the impact from impingement has not been significant during the initial license period. In accordance with the assessment completed during operation of the power plant intake, and testimony of regulatory agency staff, there are no reasonable structural or operational changes that can be implemented to further reduce impingement losses at the facility. Additionally, losses are so minor that PG&E considers mitigation to be not necessary. This report concludes use of once-through cooling at DCPP does not result in significant impingement losses, or demonstrable impacts to fish and shellfish resources in the vicinity of the facility. Impingement impacts from cooling system operation during a license renewal period, based on determination of impingement significance and ecological impacts during the current operating license period are projected by PG&E to be small. Nonetheless, the PG&E 2009 report states the shoreline intake impingement data are for the field investigation performed from April 1985 through March 1986 and before the commercial operation of Unit 2. Consequently, the 1985–1986 field study may not be representative of the current day situation.

3.2 Closed-Cycle Cooling Systems

3.2.1 Background

The steam that drives the main turbine in a large electric power plant is condensed and cooled by large quantities of water that is circulated through a surface condenser. The circulating water then transfers that heat to the general environment, either directly or indirectly, through another heat transfer process.

The direct method is a once-through cooling system, where the circulating water is pumped from a large source such as the ocean, a river or a lake, through the surface condenser and returned to the source, where the heat is dissipated. The entire volume of cooling water is continuously supplied from and discharged to the water source. The indirect method is a closed-cycle system, where the circulating water is pumped from its own reservoir through the surface condenser, then through a cooling medium (such as a cooling tower or heat exchanger) where the heat is transferred to the environment, then back to the reservoir. A closed-cycle system uses much less water than the once-through cooling, as the volume of cooling water is continuously recirculated through the system with makeup from a source (for example, ocean or other water source) supplied only as required to replenish losses to the environment (for example, through evaporation in a cooling tower) and to control the water chemistry in the system. However, a closed-cycle system results in lower plant cycle efficiency because the cooling water (heat transfer medium) is recirculated and therefore has a higher overall temperature than the cooling water in a once-through system. The closed-cycle can use either wet or dry cooling methods for cooling, or a hybrid wet/dry cooling method, which is a combination of both wet and dry methods.

In addition to the thermal requirements associated with condensing the turbine exhaust steam, additional cooling is required for other processes and components in the plant that support the primary function of generating electricity. All of these requirements, collectively, define the overall heat removal requirements for a power plant.

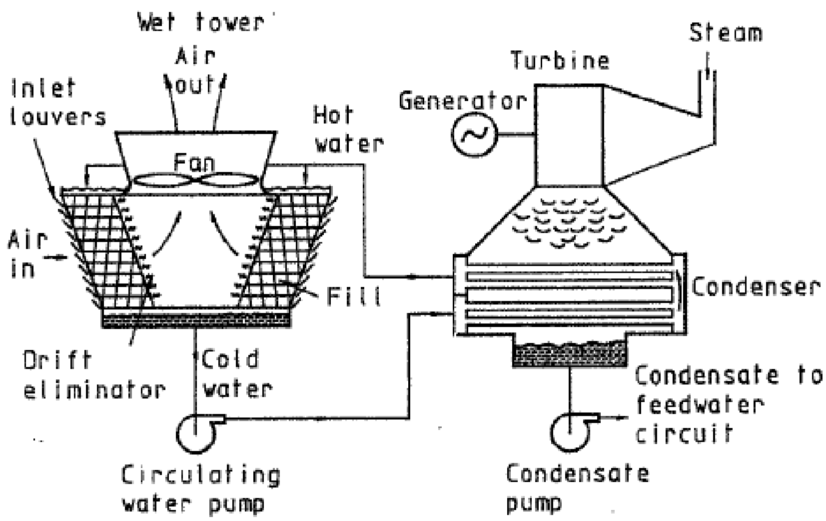


Figure CC-1. *Sample Closed-Cycle System Using a Wet Mechanical (Forced) Draft Cooling Tower (Kroger, 2004)*

DCPP was designed for and operates with once-through cooling systems for both DCPP units. This study evaluates five typical alternative closed-cycle system heat transfer technologies for possible application to meet the DCPP cooling requirements. These technologies were investigated due to their ability to satisfy the requirements of the *California Once-Through Cooling Policy*. This is because the dry technologies will only require minimal makeup to account for system leaks/losses after the closed system is initially charged and the only water sources that will be available for the wet technologies are freshwater and reclaimed water because there are fatal flaws associated with the use of seawater for the wet technologies, which is described in Section 4 of this report. The freshwater and reclaimed water sources are assumed to be available either from wells, piped in from nearby water treatment facilities or supplied from desalinization units. The only significant continuous makeup that will be required from the ocean for any of the closed-cycle options will be what is required to support any safety-related systems that were not evaluated as part of this phase of the study.

The five closed-cycle technologies evaluated are:

- Passive Draft Dry/Air Cooling
- Mechanical (Forced) Draft Dry/Air Cooling
- Wet Natural Draft Cooling
- Wet Mechanical (Forced) Draft Cooling
- Hybrid Wet/Dry Cooling

Five experienced manufacturers of both wet and dry cooling systems provided input on conceptual designs for each of these technologies based on specific site design criteria. Bechtel also had discussions with each regarding the applicability and technical feasibility of the technologies to meet the needs of the DCPP plant.

The manufacturers that provided input were Evaptech, Inc., GEA Power Cooling, Inc., Hudson Products Corporation, International Cooling Tower, Inc., and SPX Cooling Technologies, Inc.

For each of the technologies described, there are different design variations available. Examples include forced (located at air inlet) or induced (located at air outlet) draft fans for the mechanical draft technologies, varying heat exchanger configuration for the dry technologies, and cross-flow and counterflow wet tower configurations. Detailed evaluation of which variation is optimum for DCPP will be carried out in the next phase of this study, and so many of the variations available are all described in the technology descriptions below.

3.2.2 Dry/Air Cooling

Dry/air cooling systems cool fluids circulated inside of finned tube heat exchangers using conduction, convection, and radiation (sensible heat) to remove heat from the fluid. The heat is transferred to ambient airflow that is induced over the finned tubes by either natural or mechanical draft means. No evaporation of the cooling water is involved and the dry cooling performance is related to the ambient air dry bulb temperature. Dry technologies result in higher cooling water temperatures and, thus, higher turbine backpressure and decreased generator output as compared to wet technologies. This situation is always the case because the dry bulb temperature is always higher than the wet bulb temperature, which governs the cold water temperature achievable with wet cooling designs, described in Section 3.2.3. Additionally, dry technologies require greater heat transfer surface area and greater airflow since they do not use the more efficient evaporative cooling process. The advantages of dry systems over wet include minimal makeup water usage and the absence of issues associated with wastewater disposal, drift emissions, and visible plume formation.

There are dry technologies known as air-cooled condensers that condense steam from the turbine generator directly using ambient air. This requires the exhaust steam from the turbine to be ducted to the location of the air-cooled condenser. Due to the available locations that could accommodate the large air-cooled condensers required for DCPP, the steam duct would exceed the length recommended by air-cooled condenser manufacturers. The estimated duct lengths for the site would result in a pressure drop so great that the turbine could not operate because of the resulting high backpressure at the exhaust.

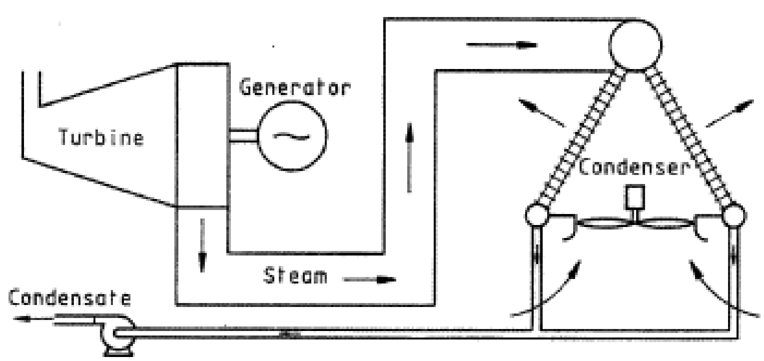


Figure CC-2. *Sample Air-Cooled Condensers (Kroger, 2004)*

For this reason, the dry technologies considered in this study are air-cooled heat exchangers, where the turbine steam would still be condensed in the surface condenser and the circulating cooling water is pumped in a closed-cycle from the condenser to the air-cooled heat exchangers. The water is circulated in a closed system inside the heat exchanger tubes, which are available in various grades of materials to accommodate use of a variety of water qualities.

Any available water at DCPP would be acceptable to use with the dry technologies because each technology could be designed to accommodate the specific water quality (seawater, reclaimed, etc.). This is done with proper tube material, structural member coating, mechanical equipment rating, etc. Significant continuous makeup is not required for the dry technologies because the only losses once the closed systems are initially charged are due to leakage and occasional maintenance losses.

There are two dry cooling technologies: passive draft and mechanical draft. The specific names for these technologies vary by manufacturer.

3.2.2.1 Passive Draft Dry/Air Cooling

In a passive draft dry/air cooling system, the air-cooled finned tubes are arranged in a shell that is usually hyperbolic in shape. The tower is designed to use convection to dissipate the heat from the tubes to the air flowing over them, with the airflow driven by the difference in air temperature and density between the inside and the outside of the tower. The finned tubes are grouped in bundles and can be arranged in various configurations at the base of the tower or stacked inside the tower.

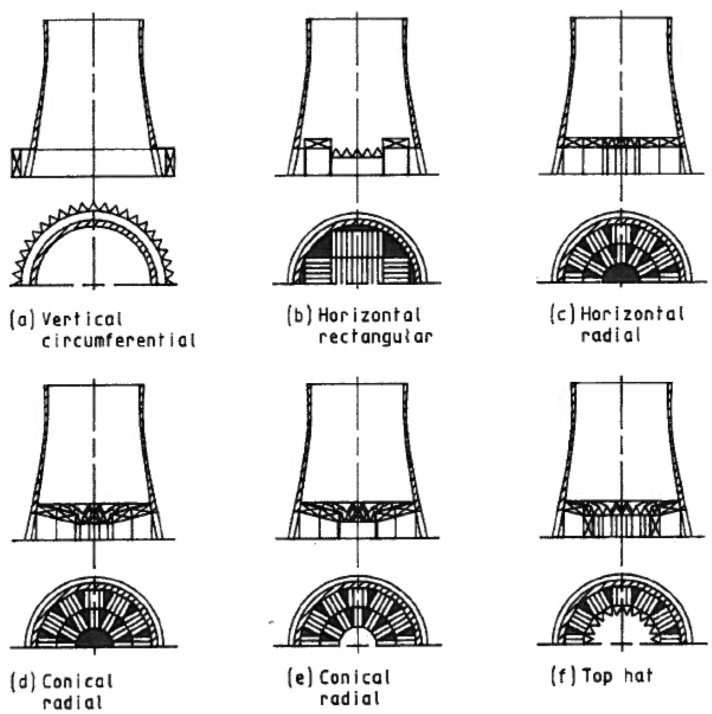


Figure CC-3. *Sample Heat Exchanger Configurations for Passive Draft Dry/Air Cooling Towers (Kroger, 2004)*

A Heller system couples a passive draft dry/air cooling tower with either a surface or spray condenser. The system described in this study assumes that the existing surface condenser will be used (with any modifications as required). An example of the latter configuration is shown in the figure below with a spray condenser and a recovery turbine to maximize the turbine generator output to the fullest extent. Both configurations are technically feasible for DCPP and, therefore, the benefits of each condenser-type will be evaluated in detail in the cost analysis (that is, comparison of condenser replacement costs vs. potential benefit of greater plant output) that will be performed in Phase 2 of this study.

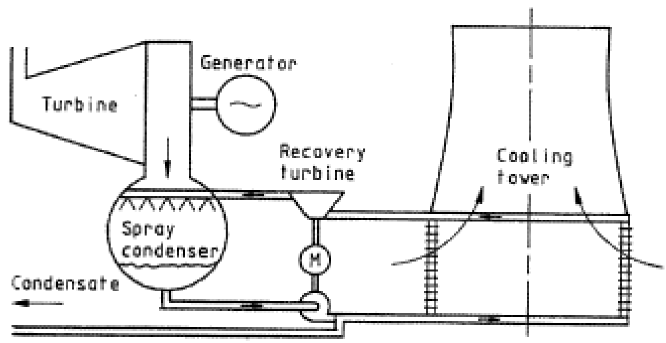


Figure CC-4. *Sample Heller System (Kroger, 2004)*

The passive draft dry/air cooling tower is less expensive to operate than a comparably sized mechanical draft cooling tower due to the lack of mechanical equipment (fans and motors) required to induce airflow over the finned tubes. To create the required draft, the tower must be very tall resulting in a higher installed cost than mechanical draft towers, but there are operational cost savings associated with the fact that there are no fans and, thus, no power requirements and maintenance activities associated with them.

Based on the design requirements for the site, which are described in detail in Section 4.5, three natural draft towers per unit (six total for the site) are needed to support DCPP operation. The towers will be approximately 610 feet in diameter and approximately 570 feet tall. The towers will need to be spaced approximately a diameter distance apart to minimize the chances of the hot discharge from one tower being entrained into the intake of a nearby tower, negatively impacting the performance of the nearby tower (known as interference) or to avoid any of the towers being starved of required incoming airflow. Consequently, the most plausible location for the cooling towers is to the north of the plant, as depicted in the conceptual plot plan and described in Section 4.8. It has to be noted that these towers cannot fit within the boundaries of the Owner-controlled area. The system will not require substantial makeup water, only potentially a small amount to make up for system losses such as leakage and water chemistry control. This water could be supplied by seawater from the current intake structure from the Pacific Ocean, or fresh or reclaimed water from wells or a nearby water treatment facility, or a desalination facility.

Figure CC-5. *Conceptual Plot Plan Passive draft dry/air Cooling*

3.2.2.2 Mechanical (Forced) Draft Dry/Air Cooling

A mechanical (forced) draft dry/air cooling tower also removes heat from the circulating water in air-cooled finned tubes, but relies on fans to drive the airflow over the tubes. This tower does not require a large shell. The finned tubes are bundled and installed in varied arrangements, but often in a horizontal rectangular array to maintain a lower profile. This is the configuration that was considered for DCPP. The fans can be located on the air inlet side of the tube bundles (forced draft) or on the air outlet side of the tube bundles (induced draft) and they can be designed to regulate the airflow based on changing atmospheric conditions.

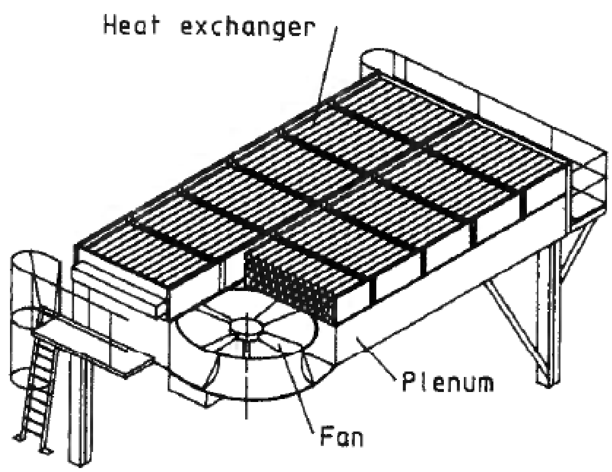


Figure CC-6*. Sample Forced Draft Mechanical (Forced) Draft Dry/Air Cooling Tower (Kroger, 2004)*

These types of dry towers can have a lower profile and can achieve lower cold water temperatures than passive draft dry/air cooling since the airflow quantity is externally controlled. However, these designs produce noise from the fans and these fans require considerable auxiliary power for operation. Special equipment and features can be incorporated into the design of any mechanical draft technology to limit the noise (such as wide chord, low noise fan designs). These optional features would, consequently, result in additional cost and increased power requirements for the tower.

To dissipate the required heat loads for the site, the mechanical (forced) draft dry/air cooling would require approximately 1,208,400 square feet of heat exchanger area per unit and 52,700 hp (39.3 MW) input power per unit to run the fans. The only plausible location for the cooling towers are to the north of the plant, as depicted in the conceptual plot plan and described in Section 4.8. It has to be noted that these towers cannot fit within the boundaries of the Owner-controlled area and additional land would need to be acquired to accommodate use of this technology. To minimize the occurrence interference between the units, these towers will be located right next to each other, essentially looking like one large air-cooled heat exchanger. Manufacturers of this technology were consulted on this approach and they agreed that this was the best layout for minimizing interference and land area requirements. To account for the fact that the towers would be placed right next to each other, the manufacturers designed them with additional air inlet height to allow adequate airflow to the interior fans and the dimensions given for this design in this report reflect this. The towers are shown with some space between them in the figure below for clarity only—they would be placed directly side by side.

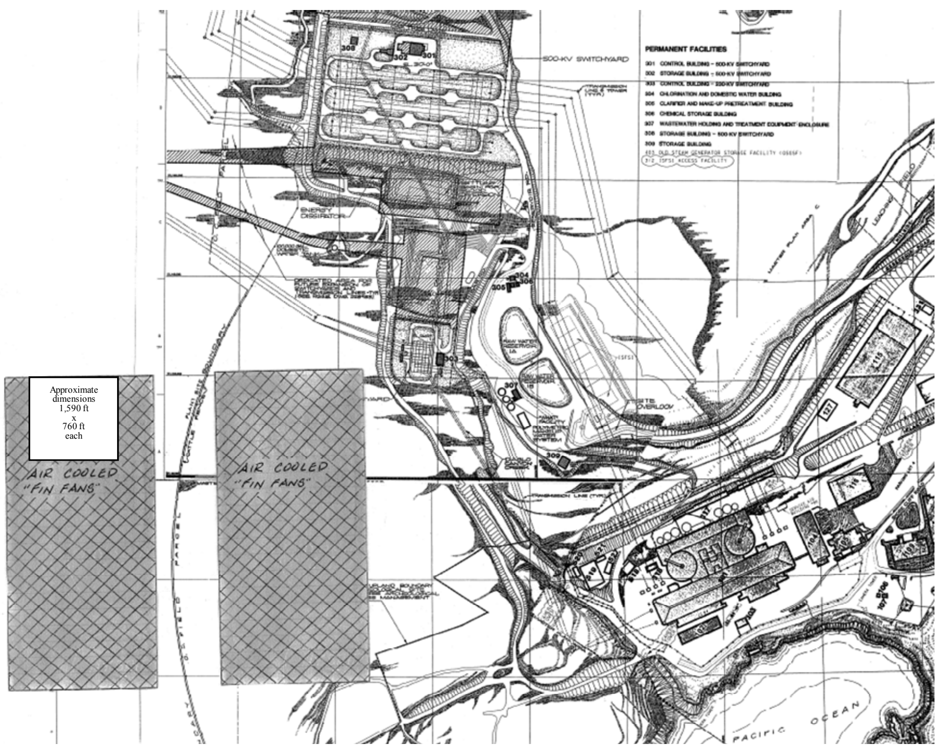


Figure CC-7. Conceptual Plot Plan Mechanical (Forced) Draft Dry/Air Cooling Towers

3.2.3 Wet Cooling

In a wet cooling system, the circulating water is cooled primarily by evaporation (latent heat transfer) when it is brought into direct contact with air in a cooling tower. Wet cooling towers use water nozzles to break the water into the smallest droplets possible and then employ fill packs to either break the water into smaller droplets (splash-type fill) or cause them to spread into a fine film (film-type fill) depending on fill type used. These actions allow the greatest water surface area possible to be exposed to the cooling air and maximize the time the water and air are in contact, facilitating maximum heat transfer. Evaporation is an effective means of cooling, and thus much less heat transfer area (smaller towers) is required for wet technologies compared to dry types.

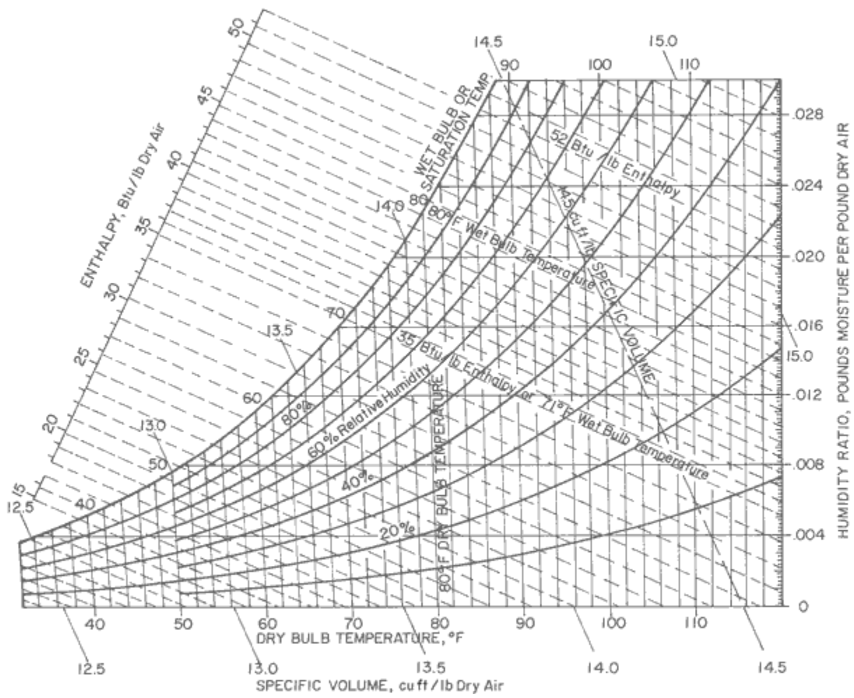


Figure CC-8. Psychrometric Chart

A psychrometric chart illustrates the fact that lines of constant wet bulb temperature are parallel to lines of constant enthalpy, whereas lines of constant dry bulb temperature have no fixed relationship to enthalpy. Therefore, wet bulb temperature governs the performance of wet cooling towers and theoretically, the lowest cold water temperature achievable is the ambient wet bulb temperature. However, because of inefficiencies in the cooling process, the cold water will not be cooled to equal the wet bulb temperature. Approach is defined as the difference between the cold water temperature leaving the cooling tower and the wet bulb temperature. The closer the wet bulb is approached, the larger and more expensive the cooling tower becomes, but the more efficiently the power plant operates. The lowest approach achievable depends on whether mechanical draft or natural draft towers are used. Given the requirements of DCPP, cooling tower manufacturers contacted indicated that an approach of 9°F is achievable with mechanical draft towers and an approach of 12°F is achievable with natural draft towers.

The wet cooling method results in exhaust air being saturated with water (the water evaporated into the sub-saturated air as part of the cooling process). Depending on ambient weather conditions, this saturated exhaust air can recondense as it is discharged to the atmosphere and be visible as a plume. The plume can be significant under certain ambient temperature, humidity, and wind conditions, and may appear as a continuous, thick cloud for hundreds of feet in the air and miles away from the tower. The severity and frequency of visible plume was not quantified for each of the various wet technologies as part of this phase of the study, but detailed analysis will be performed as part of Phase 2 to allow full evaluation of the level of hazard this plume will present.

Makeup water is required to compensate for evaporation, blowdown, and drift losses from the cooling tower. Blowdown is the term applied to the water that is discharged from the system to control concentration of impurities in the circulating water (for example, salt if ocean water is used). Drift is the water lost from the system as liquid droplets entrained in the air stream exiting the tower. Evaporation losses are essentially pure water (contaminants are left behind when the water evaporates), but the drift droplets will contain all of the solids and other chemical constituents present in the circulating water. Therefore, the drift droplets are classified as an air emission source and are subject to air permit considerations. The drift loss from the wet technology types can be limited to 0.0005 percent of the total circulating water flow rate with the application of drift eliminators installed in the towers. Circulating water pH, scale/corrosion, and biological growth are controlled with the addition of specialty treatment chemicals.

Use of wet cooling towers at DCPP will require approximately 21,800 gpm of makeup water per unit. This number was determined by assuming that the circulating water system would be run at the highest cycles of concentration allowable while adhering to the available PM-10 emission offsets for DCPP. Running the tower at the highest cycles of concentration possible minimizes the makeup requirements to the fullest extent, but unfortunately maximizes the negative environmental impacts from the drift due to the elevated concentration of solids and chemical constituents in the drift droplets. While utility-size cooling towers have been designed, built, and operated successfully using saltwater/seawater (Maulbetsch, 2010), the source of cooling water for the wet and hybrid wet/dry cooling technologies would be fresh or reclaimed water because the available PM-10 offsets are insufficient to support tower operation using saltwater. This is described further in Section 4.3.

There are two wet cooling technologies—passive draft and mechanical draft. The specific names for these technologies vary by manufacturer. For each of these types, there are different configurations available for the orientation of the cooling tower internals (cross- and counterflow arrangements).

For this study, all of the wet technology towers are assumed to be located on the undeveloped mountainous area to the north of the units within the Owner-controlled area, as depicted in the conceptual plot plan below. Previous studies sited rectangular towers on the site area south of the reactor buildings, assuming that the buildings and parking lots currently in this area could be relocated. Spacing the towers close enough together to allow them to fit in this location would result in a high probability of increased recirculation and interference between the towers and substantial negative impacts to tower performance. Additionally, this area is full of plant facilities and utilities both above and below ground and the units may not be able to operate while all of these are relocated and modified. If the towers are constructed to the north as shown below, they could be sited favorably with respect to each other (maximizing the potential for the best performance from each) and they could be completely constructed without affect on operation of the plant, significantly shortening the required outage to perform condenser work and tie-ins.

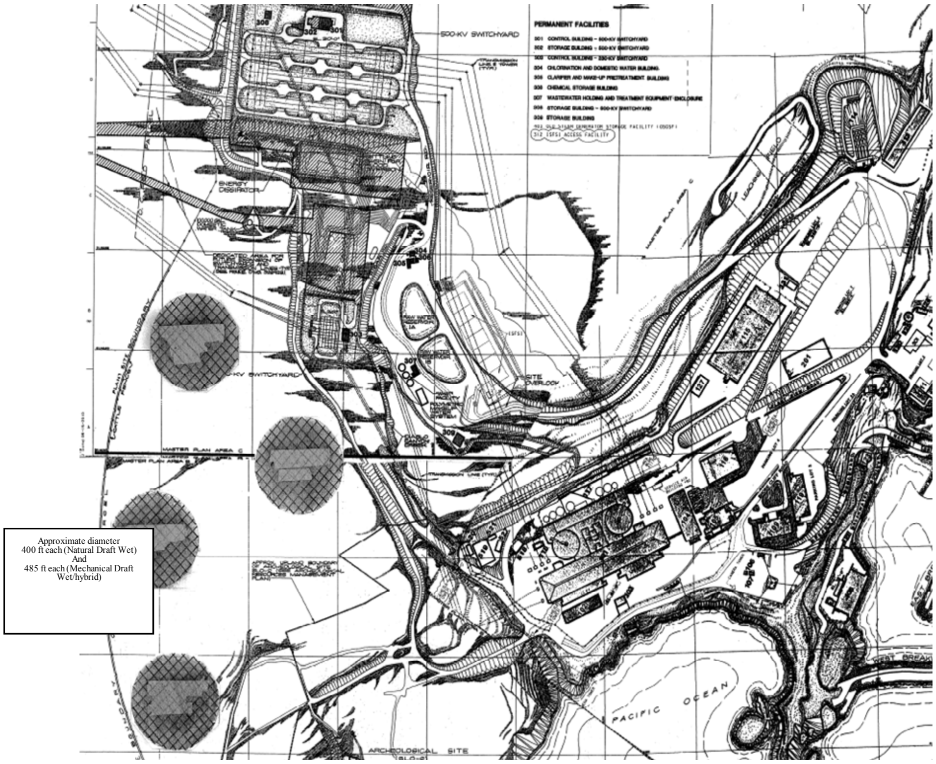


Figure CC-9. *Conceptual Plot Plan for Wet Closed-Cycle System Technologies
Wet Natural Draft Cooling, Wet Mechanical (Fixed) Draft Cooling, Hybrid Wet/Dry Cooling*

3.2.3.1 Wet Natural Draft Cooling

The wet natural draft cooling tower includes tower components (fill, nozzles, drift eliminators) that are contained inside of a shell that can be either steel or concrete. The shell induces a chimney effect to create the required draft for cooling. A density difference exists between the ambient air and the air inside of the cooling tower shell above the tower internal components (where the air is hotter and less dense) and this difference induces airflow through a natural draft tower.

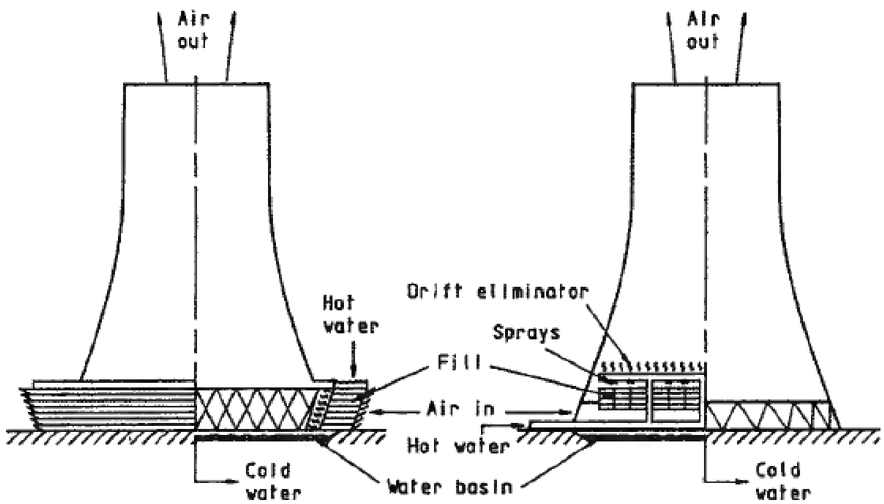


Figure CC-10. *Sample Wet Natural Draft Cooling Tower Schematics (Cross- and Counterflow Internals Configurations)(Kroger, 2004)*

DCPP would require two wet natural draft cooling towers per unit, each approximately 400 feet in diameter and 600 feet tall. The only plausible location for the cooling towers is to the north of the plant, as depicted in the conceptual plot plan and described in Section 4.8.

3.2.3.2 Wet Mechanical (Forced) Draft Cooling

Wet mechanical draft cooling towers use the evaporative wet cooling process, with multiple fans to move the air through the tower. There are both round and rectangular shapes available for the wet mechanical (forced) draft cooling towers.

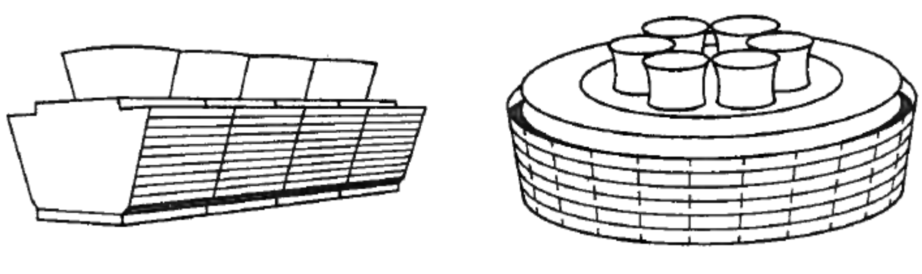


Figure CC-11. *Sample Wet Mechanical (Forced) Draft Cooling Configurations Rectangular In-Line (Left) and Round (Right)(Kroger, 2004)*

For the DCPP site, round towers were considered because this design can maximize the thermal performance since the potential for recirculation is reduced. Recirculation is a phenomenon that occurs when the hot exhaust air leaving a cooling tower is recirculated and reenters the air inlets of the tower. This increases the temperature of the entering air and thus, increases the temperature of the cold water. The possibility for recirculation increases when a low-pressure region is created on the downwind side of cooling tower (this occurs with rectangular configurations), and when tower exhaust air velocities are relatively low. In addition, round towers are typically capable of handling higher heat loads using less equivalent land area than rectangular towers.

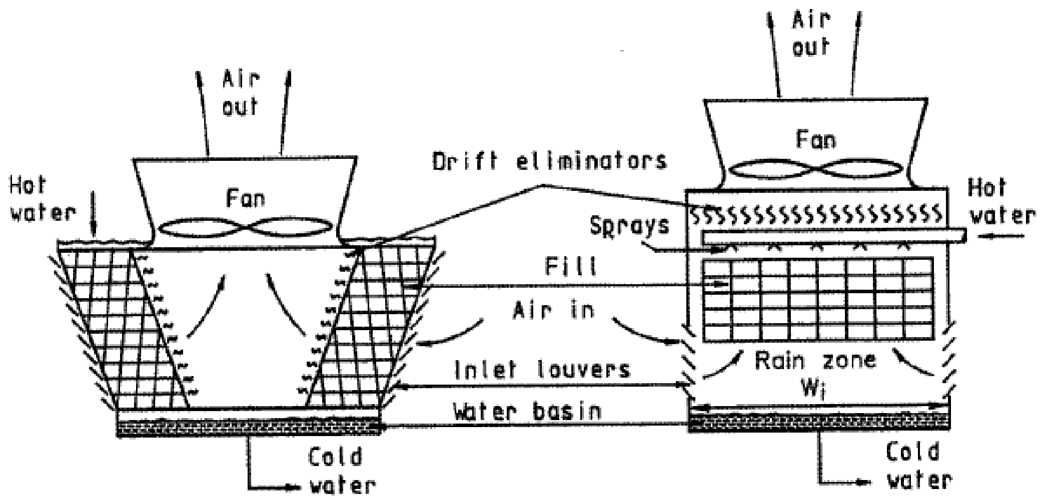


Figure CC-12. *Sample Wet Mechanical (Forced) Draft Cooling Tower Schematics (Cross- and Counterflow Internals Configurations (Kroger, 2004)*

Two round wet mechanical (forced) draft cooling towers per unit approximately 485 feet in diameter and 125 feet in height would be necessary to achieve the desired performance at DCPP. Approximately 32 fans would be needed per tower with a total fan input power requirement of 19,200 hp (14.4 MW) per unit. The only plausible location for the cooling towers is to the north of the plant, as depicted in the conceptual plot plan and described in Section 4.8.

3.2.4 Hybrid Wet/Dry Cooling

The hybrid wet/dry cooling tower technology considered in this study is the combination of the wet tower and a dry heat exchanger. Hybrid wet/dry cooling towers are slightly taller than comparable wet towers due to the addition of the dry section. This dry section abates the visible plume because after the plume leaves the lower wet section of the tower, it travels upwards through a dry section where it is heated and relatively dry air is mixed with the saturated air in a proportion that results in a mixed discharge air stream that is not at conditions that result in visible plume. This design can also result in slightly reduced evaporative losses as compared to an all wet cooling tower because the dry section can dissipate some of the thermal load without using evaporation (for example, conductive, convective, and radiative heat transfer takes place in the dry section finned tubes). These tower systems result in greater capital and operating and maintenance costs because of the extra equipment associated with the dry section. However, hybrid wet/dry cooling towers would offer a great advantage to DCPP since they provide the benefit of efficient wet cooling without the visual impact of plume and they are much lower in profile than natural draft towers.

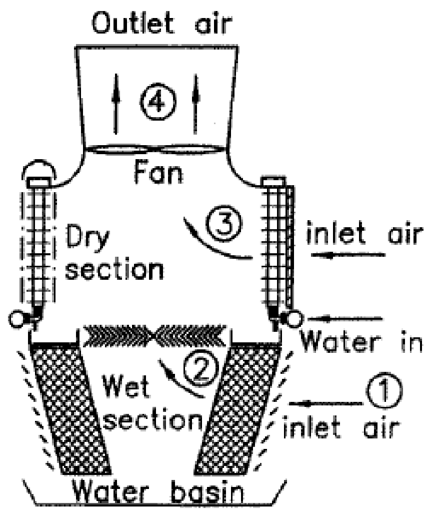


Figure CC-13. *Sample Hybrid Wet/Dry Cooling Tower Schematic (Kroger, 2004)*

Taking into consideration the thermal and realistic plume-free requirements at DCPP, a hybrid wet/dry cooling system would need to consist of two round forced-draft towers per unit. A schematic of this tower type is included below. Each tower has an overall diameter of approximately 485 feet and 175 feet tall. The only plausible location for the cooling towers is to the north of the plant, as depicted in the conceptual plot plan and described in Section 4.8. Over 60 fans per tower using a combination of 200 hp and 300 hp would be required to provide airflow over both the wet and dry sections. The total fan power requirement would reach approximately 32,000 hp (23.8 MW) per unit. When the plume abatement equipment is in operation, the evaporative rate of a hybrid wet/dry cooling tower is less than that of one operating wet tower. This is because the process used to reduce plume visibility results in some recondensation of the water droplets that had been evaporated into the exiting air stream. The makeup water requirement for the hybrid wet/dry cooling towers considered in this study is approximately 19,620 gpm per unit. This would need to be supplied by either a fresh or reclaimed water source. The existing once-through intake structure on the ocean would not be used to supply this makeup water.

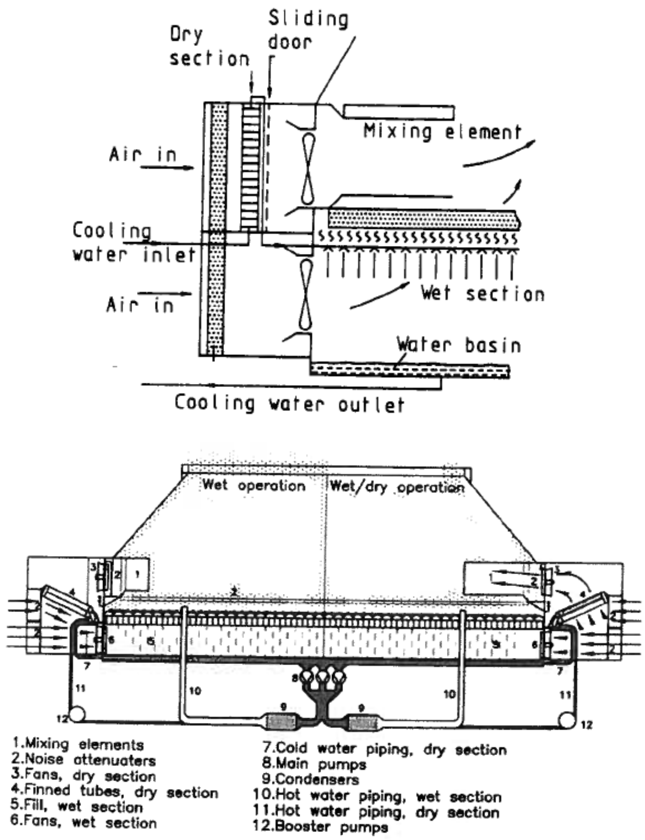


__Figure CC-14__. Sample Round Configuration Hybrid Wet/Dry Cooling Tower Schematic (Kroger, 2004)

Table CC-1
Closed-Cycle Cooling Systems Technology Summary

Parameter	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Number of towers required	6	2	4	4	4
Area required per tower, ft²	292,247	1,208,400	125,664	184,745	184,745
Total area required (for all towers, including required spacing in between), ft²	6.4 million	3.0 million	1.2 million	1.8 million	1.8million
Overall height, ft	570	123	600	125	175
Makeup requirement per unit, gpm	Insignificant	Insignificant	21,800	21,800	19,620
Fan power requirement per unit, hp	0	52,700	0	19,200	32,000
Fan power requirement per unit, MW	0	39.3	0	14.4	23.8

Note that all of the sizing and power requirements for the various technologies provided in this section are approximate based on preliminary discussions with several cooling system manufacturers. The values above may vary depending on the final manufacturer chosen to supply towers for the site. Additionally, these numbers may change if the design requirements for the towers (described in Section 4.5) are modified during detailed design and optimization of a closed-cycle system for DCPP.

3.3 Deepwater Offshore Intake

As described in Sections 4.2.2 below, the fish and fish larvae are distributed over a wide range of water depths and offshore distances. In addition, fish can be attracted to the offshore intake structures due to their behavioral characteristics. As a result, no definitive site and water depth can be identified for the offshore intake that would comprehensively meet the objectives of the *California Once-Through Cooling Policy* rule, especially pertaining to improvements on entrainment reduction. Nonetheless, the engineering requirements for a deepwater intake system (velocity cap technology), with a withdrawal location approximately 2,000 meters (6,560 feet) offshore of DCPP and with a water depth over 100 feet is used as the basis for the screen criteria evaluation described in Section 2.3. This offshore location combined with DCPP once-through cooling water flow rate are pushing the limits of the state of technology for hydraulic design for large pump intake systems. In terms of impingement and entrainment evaluation for deepwater offshore intakes, this selected intake location covers a much further distance and deeper intake located at water depths of 200 to 250 feet.

The relocation of the withdrawal point from the shoreline to a location 2,000 meter (6,560 feet) offshore, or further, will require the construction of a new tunnel under the seabed. This tunnel system will result in an additional pressure drop of over 8 feet, and will necessitate the need for a new shoreline pump intake structure and associated equipment.

The implementation of the deepwater tunnel intake system will require that the intake cove (basin) be enclosed with a breakwater to prevent direct inflow from the open sea to the intake basin. The new tunnel will pass underneath the breakwater and extend offshore to the intake head assemblies. The offshore tunnel/velocity cap intake system requires the following components:

- Construction of a common drop shaft (main shaft) nearshore in the enclosed shoreline basin.
- Installation of an offshore rock tunnel of 30 to 32 feet diameter that connects the main shaft to the offshore drop shafts located beyond 2,000 meters from shoreline.
- Installation of six offshore drop shafts that support installation of the offshore velocity caps.
- Installation of six offshore velocity caps, one for each drop shaft, to supply water to the tunnel.
- Construction of a new shoreline pump station with new pumps, motors, screens, and trash bars.
- Construction of an enclosed shoreline basin by extending the existing inner breakwater.

- Construction of a new shoreline pump house to have a deeper pump forebay and new set of pumps, pump motors, traveling screens, and trash bars.

Figures DW-1 and DW-2 show the schematic arrangements for this alternative. A brief description of these components follows below.

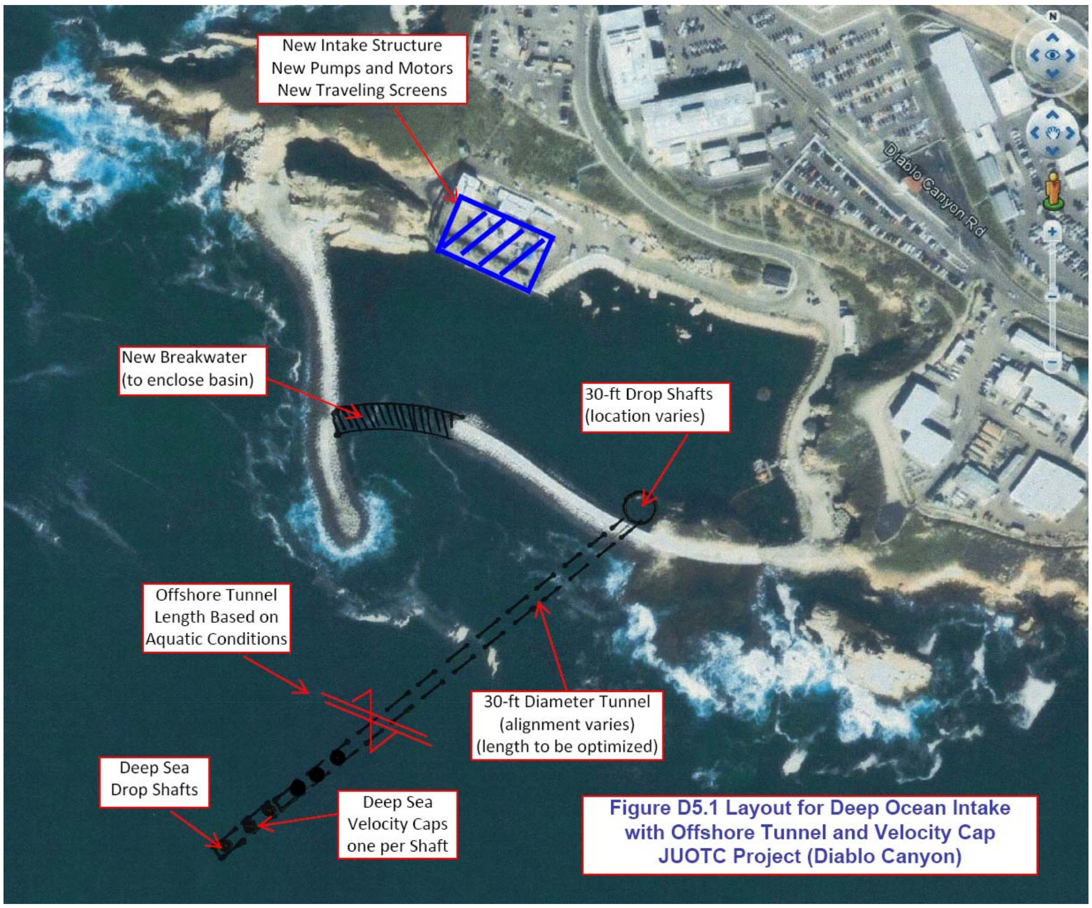


Figure DW-1. *Layout for Deep Ocean Intake with Offshore Tunnel and Velocity Cap*

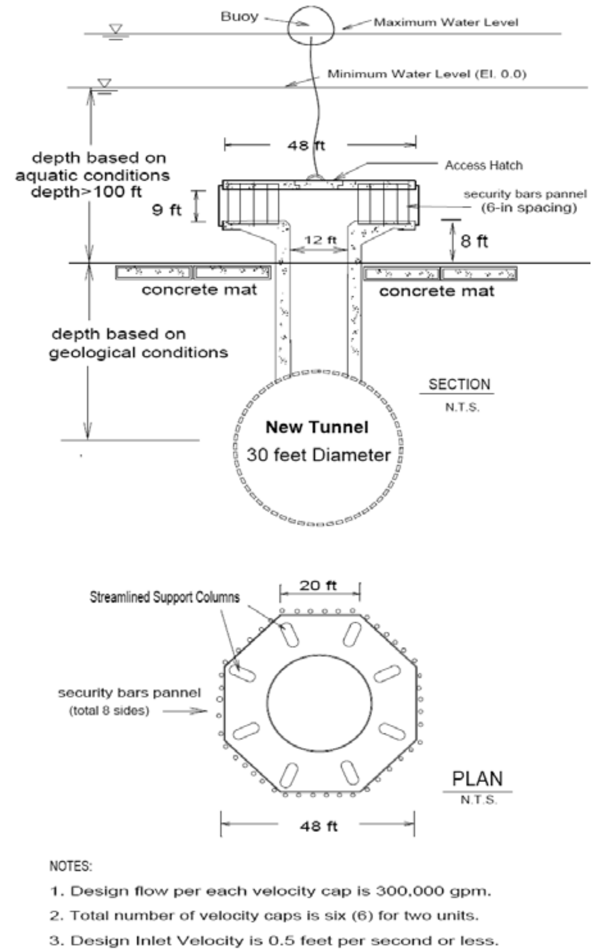


Figure DW-2*. Deep Sea Velocity Cap Intake Concept*

A 30- to 32-foot-diameter rock tunnel will be constructed using a tunnel boring machine to connect the main drop shaft to the offshore drop shafts. The offshore tunnel length will depend on the seawater depth criteria and its relationship to marine biological sensitivity and species populations. The tunnel length of 2,000 meters and higher is considered for evaluation.

The tunnel lining requirement depends on the rock conditions encountered, but the tunnel is assumed to be unlined for hydraulic concept assessment. The main drop shaft will have a diameter similar to the tunnel to provide access for the tunnel boring machine. The shaft will ultimately be used as seawater supply conduit. A construction access shaft (not shown in Figure DW-1) may be required to facilitate construction sequencing. The depth of the tunnel below seabed will be determined based on local geological conditions. A longer tunnel will likely encounter more geological variations along its alignment and will require special engineering considerations with respect to seismic and geotechnical design.

The common main shaft will be used to convey the plant cooling water, collected from offshore velocity caps, to the shoreline basin through the underground rock tunnel. The offshore drop shafts (total 6) that receive water from velocity caps will be constructed through barge-based marine drill operations. The method of construction will depend on the selected sea depth and it may require specialized construction methods, which can be time-consuming. The tie-in of the drop shaft to the underground tunnel will be performed after the tunnel is completed. The offshore drop shafts will have a minimum inside effective diameter of 12 feet limited by availability of the associated specialized equipment.

The shoreline basin is constructed by extending the existing inner breakwater westward, which will close the intake cove from direct contact with open sea environment. The only connection of this basin to the sea will be through the tunnel and its shafts. The conservative assumption used in sizing the offshore velocity cap inlets is based on no flow allowance through the breakwater. By existing breakwaters being porous, this introduces an important positive hydrodynamic parameter for alternative technologies using the velocity caps and wedge wire screens. Any manageable water passage porosity, meeting the regulatory requirements, reduces the load on the offshore inlets and can be considered as an additional factor of safety in ensuring the value of inlet velocity is maintained below 0.5 fps. Several facts regarding the use and function of breakwater can be considered:

- The submerged portion of breakwater is mostly boulder/tri-bar structure the flow passage upon closure of the structure will be greater than the intended wedge-wire slot size openings but far smaller than the velocity cap opening.
- The flow passage through the breakwater will be extremely irregular and not convenient for free passage by aquatic life.
- Since the passage of nutrients through the breakwater is expected and the rocks being ideal habitat for barnacles and mussels, it is expected the passages to become infested with biofouling.
- With passage of time, the dead barnacles and mussels will occupy the voids between the rocks and are expected to reduce the porosity to very low values. The porosity becomes very small if trash also enters the voids.

Since the original design of breakwater was based on absorbing the ocean swell energy, then this breakwater modification will be supported through numerical and possibly through physical model study to assure that the stability of the breakwater has not been compromised. In addition, the future reengineering efforts has to be reviewed and approved by the Nuclear Regulatory Commission due to breakwaters being part of the nuclear licensing basis. This aspect will be evaluated during Phase 2.

Due to the anticipated substantial pressure drop along the long offshore tunnel system, the existing shoreline pump intake structure cannot be used due to the considerable drop in water levels at the pump resulting from the long intake tunnel and a new shoreline pump station will be required. The new, deeper pump station will have new pumps, new motors, new traveling screen, new trash bars, and a new fish collection and return system. Consideration of additional traveling water screen areas may be necessary to reduce through-screen velocity to 0.5 fps or lower. Also, the screens should be equipped with a fish-handling and return system to further reduce impingement losses and avoid fish entrapment. During the construction phase of the new shoreline intake structure, measures will be implemented to maintain the safety-related auxiliary saltwater pumps operational, as required.

Velocity Cap Details

Each velocity cap will be octagonal in shape and 48 feet across the top width. Considering the large amount of cooling water withdrawal requirements, the velocity cap horizontal openings will be sized to be large enough to maintain an inlet velocity of 0.5 fps. Large object/debris bars will be provided at the inlet to prevent the entry of this debris into the tunnel. The bars will be 150 millimeters (6 inches) apart center to center. Due to large inlet openings, the fish and floating debris such as kelp and algae will be able to enter the velocity cap and reach the shoreline intake. The amount of such material will be substantially less than current conditions due to the system's small inlet velocity, the submerged nature of inlet, and the inlet's elevation from the sea bottom.

The placement of the offshore velocity cap assemblies will not be an obstruction to surface navigation due to their deep location. Warning buoys may be used to ensure large ships or barges stay away from the velocity caps area.

The velocity caps will be in deeper, generally less biologically productive areas. The inlet velocity of 0.5 fps is comparable to local sea currents, which will enable even juvenile fish to swim away from these intake areas safely. The velocity cap technology design provides a controlled inlet velocity, a submerged inlet elevated above the sea floor, and a radial horizontal inlet velocity field, free from swirling flows. The offshore velocity caps assemblies will not present an obstacle to surface navigation due to its deepwater location.

The above velocity cap technology description also is applicable to Section 3.4.

3.4 Initial Intake Relocation

The relocation of intake to offshore involves enclosing the intake cove (basin), thereby preventing direct inflow to the intake basin and introducing a new tunnel underneath the breakwaters extending offshore where the velocity cap assemblies will be located. The offshore location of velocity caps will depend on bathymetry such that there is a minimum of 30 feet of water depth available during the minimum tide level condition.

The offshore tunnel/velocity caps intake system consists of the following components:

- A common drop shaft (main shaft) constructed nearshore in the enclosed shoreline basin.
- An offshore rock tunnel of 30 to 32 feet diameter connecting the main shaft to the offshore drop shafts.
- Minimum of six offshore drop shafts to install offshore velocity caps.
- Minimum of six offshore velocity caps, one for each drop shaft, to supply water to the tunnel and then to the shoreline basin.
- An enclosed shoreline basin is constructed by extending the existing inner breakwater.
- Fish collection and return system is added to each individual traveling water screen. Collected fish will be returned to the ocean via the return line from the pumphouse.

Figures IR-1 and IR-2 show the schematic arrangement for this technology. A brief description of components is as follows:

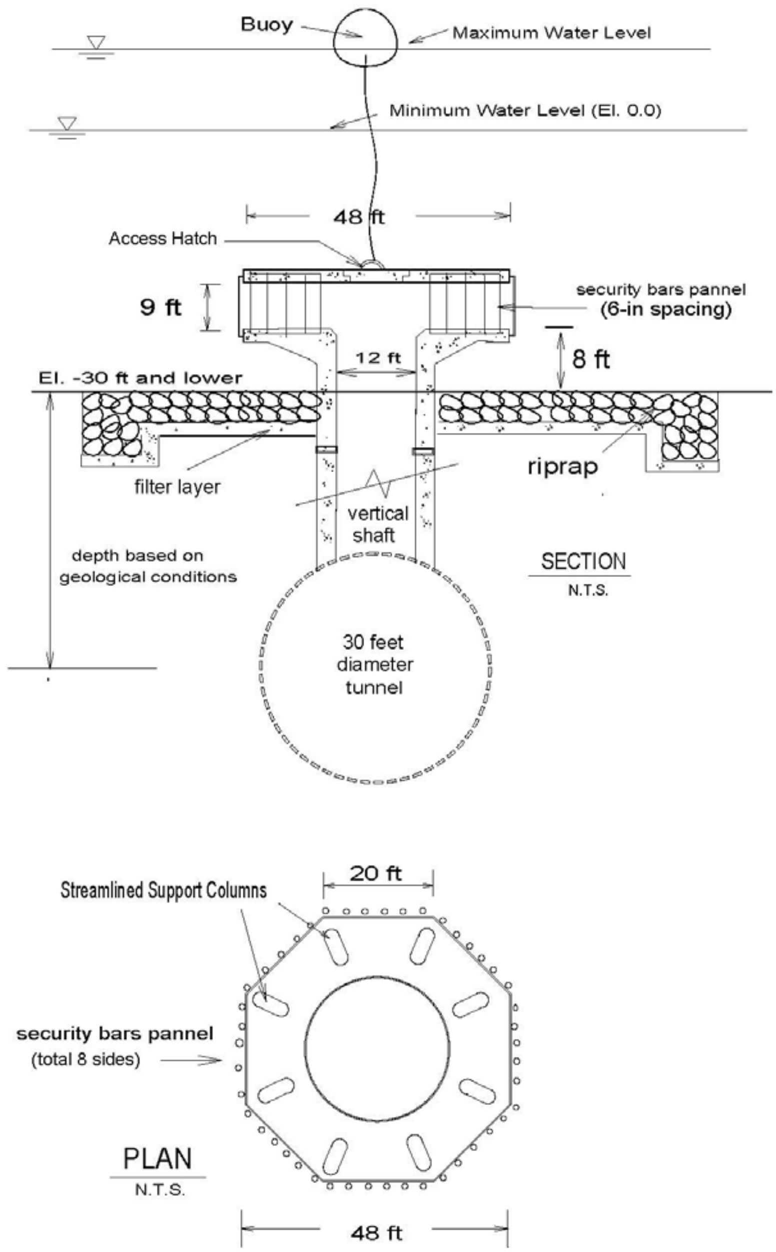
A 30- to 32-foot-diameter rock tunnel could be constructed using a tunnel boring machine to connect the main drop shaft to offshore drop shafts. The offshore tunnel length will depend on the seawater depth requirements, but the length is estimated to be approximately 1800 feet. The tunnel will be unlined. The main drop shaft will have a diameter similar to the tunnel to provide access for the tunnel boring machine. This shaft will ultimately serve as a seawater supply conduit. A construction access shaft (not shown in the figures) may be required to facilitate construction sequencing. The depth of the tunnel below seabed will be determined based on local geological conditions. Some sections of tunnel may need to be lined based on the geological conditions.

The common main shaft will be used to convey the plant cooling water, collected from offshore velocity caps, to the shoreline basin through the underground rock tunnel. The offshore drop shafts (6 shafts), which receives water from velocity caps and transfer it to the intake basin, will be constructed using a barge-based marine drilling process or installed in dry conditions inside a temporary cofferdam, as applicable. The tie-in of the drop shaft to the underground tunnel will be made after the tunnel is completed. The offshore drop shafts will have a nominal inside effective diameter of 12 feet.

The shoreline basin is constructed by extending the existing outer breakwater southward, which will close the intake cove from direct contact with the open sea environment. The only connection of this basin to the sea will be through the tunnel.

To allow the opportunity for the entrapped fish in the pumphouse to escape, a fish collection and return system will be added to each traveling water screen. Existing screens will be modified to add fish buckets at the bottom of each screen panel and will include dual pressure sprays, low-pressure spray at 10 psi to get fish to the return piping, and high-pressure spray to dislodge debris to the trash grinder. A fish return line will be added to return the fish to the ocean outside the western side of the cove.

Figure IR-1. Offshore Tunnel with Velocity Cap Layout



NOTES:

1. Design flow per each velocity cap is 300,000 gpm.
2. Total number of velocity caps is six (6) for two units.
3. Design Inlet Velocity is 0.5 ft per second.

Figure IR-2. *Offshore Velocity Cap Intake Concept*

3.5 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

This section provides the general description of this technology, while detailed evaluations are provided in Section 4 against various evaluation criteria.

Inshore fine mesh screens technology can be implemented through three modifications to the existing DCPP shoreline pump intake as follows: (1) convert the existing flow-through screens to dual flow screens, (2) replace the coarse mesh screens (3/8 in opening) with fine mesh screen panels (1 millimeter x 4 millimeters or 2 millimeters x 6 millimeters rectangular mesh, creating an effective mesh opening of 1 to 2 millimeters), and (3) install fish collection and return system to each traveling water screen, with the fish return pipeline routed to the open sea. Figure IFMS-1 shows the new fish return piping route, Figure IFMS-2 shows the conceptual conversion to dual flow screen with fish collection and return. Figure IFMS-3 shows the difference of how flow passes through the screen between a typical through flow screen currently in use at the DCPP intake and the proposed dual flow screen.

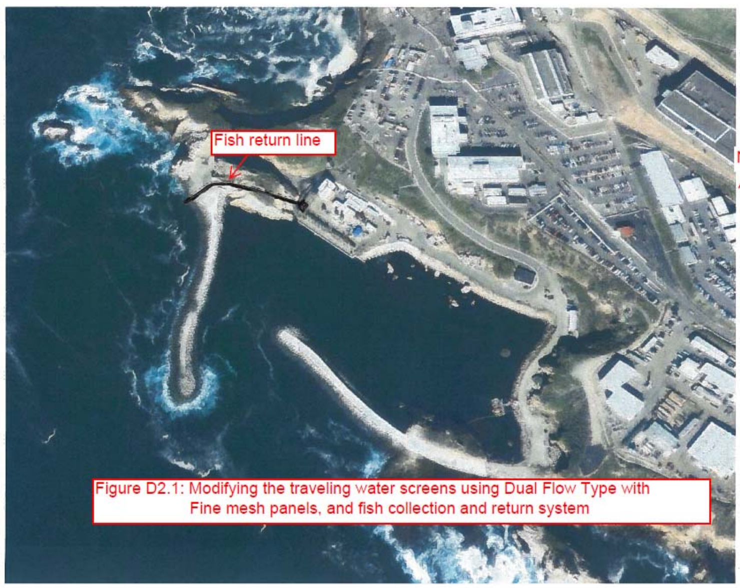


***Figure IFMS-1**. Modifying the Traveling Water Screens Using Dual Flow Type with Fine Mesh Panels, and Fish Collection and Return System*

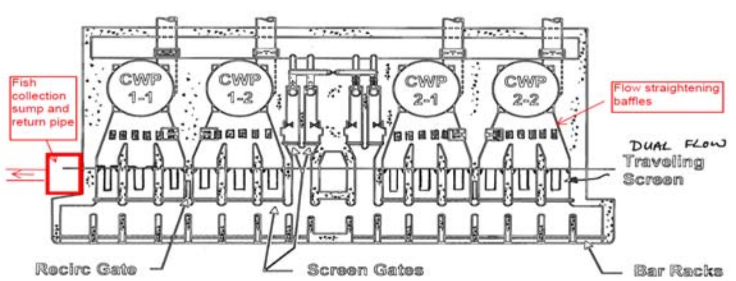


***Figure IFMS-2.** Converting Existing Flow-Through Traveling Screen to Fine Mesh Dual-Flow Traveling Screen, with Fish Collection Buckets and Return Systems*

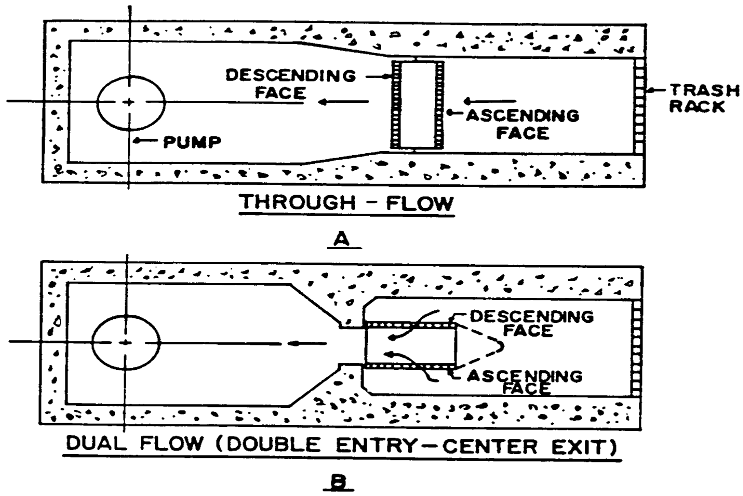


Figure IFMS-3. *Comparison of Through-Flow Screen vs. Dual Flow Screen*

The existing through-screen velocity of 1.95 fps is well above the 0.5 fps criterion stipulated in the proposed Section 316(b) Phase II rule. However, according to USEPA proposed rule, Section 122.21(r)(6) on proposed impingement mortality reduction implementation plan, "if intake velocity is not maintained at less than 0.5 fps, the regulation requires modified traveling screens to include collection buckets designed to minimize turbulence to aquatic life, the addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen material with smooth woven mesh, a low pressure wash to remove fish before any high-pressure spray to remove debris on the ascending side of the screens, and a fish handling and return system with sufficient water flow to return the fish to the source water in a manner that does not promote predation or re-impingement of the fish." (USEPA, April 2011). Therefore, the addition of a fish collection and return system marks a significant improvement in the impingement mortality reduction.

Second, while the fine mesh screen with a mesh opening of 1 or 2 millimeters will significantly reduce the entrainment of larval organisms through the screen mesh, these screens will result in impingement of the egg/larvae larger than 1 or 2 millimeters on the screen face. In response to this issue, the fish collection and return system includes a low-pressure spray, which is designed to wash the egg/larvae along with fish off the screen face and into the fish return system.

Finally, with the significant reduction of mesh opening (from the current 3/8 in [9.5 millimeters] to 1 to 2 millimeters), the screens will experience a substantially higher debris load on screen panels since all the debris having larger than the smaller mesh size will be precluded from entering the downstream system. This much higher debris loading on the screen panels must be removed to avoid overloading or collapsing the screen panels. The debris-handling performance of traveling screens is measured by screen renewal factor, that is, how fast the clean screen mesh can be made available to handle the incoming debris. A higher screen renewal factor can be achieved in three ways: (1) increasing the screen surface area, (2) increasing the screen rotation speed, or (3) using these methods in combination. The solution is to use (3), by converting the current flow-through screen to a rotating dual-flow screen system, which offers twice the screen surface area. This system is then paired with a continuous variable speed drive. The variable screen rotation speed can be as high as 40 feet per minute. While the dual-flow screen has twice the screen surface area of the through-flow screens with the same panel length, the effective improvement in debris handling is more like 50 percent.

Implementation of this technology will demand a unit outage. However, this modification will not impact the continuous operation of safety-related auxiliary saltwater pumps, which are located in the separate chamber of the pump house and served by separate 5-foot-wide screens. It should be noted that the screen retrofit as described in this section will result in reduced through-mesh velocity. However, the through-mesh velocity will still be higher than 0.5 fps. If it is determined that through-mesh velocity needs to be 0.5 fps or lower in order to comply with the *California Once-Through Cooling Policy*, additional measures will need to be evaluated during Phase 2.

3.6 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

Retrofitting the DCPP intake to incorporate the wedge wire screen technology would require major structural modification and new construction. It is apparent from the review of the near coast environment and bathymetric data that the use of this technology would require that the screens be located a significant distance offshore from the intake cove, as there would not be sufficient water depth and sea current (for the sweeping of aquatic organisms and debris) inside the intake cove for the screens to function properly.

The concept selected for installation of this screening technology involves (1) enclosing the intake cove to form a shoreline basin to prevent direct seawater inflow to the existing intake structure and (2) introducing new conduit(s), either pipes or a tunnel, that would go underneath the breakwaters and extend offshore where the wedge wire screen assemblies are attached to convey filtered seawater back to the intake. There are other potential variations to this concept using a different alignment and/or sizes for the connecting conduits. Further assessment of detailed engineering data and permitting requirements will be required in the Phase 2 assessment to establish the optimal arrangement of the wedge wire screens,.

The offshore location of the wedge wire screens depends on local bathymetry and biological sensitivity. A minimum of 30 to 40 feet of water depth during low tide with some consideration of passing ocean waves is typically required to support hydraulic performance of the screens.

The open sea oceanographic setting and geological characteristics offshore of DCPP, as described in Section 3.1, poses a significant challenge to offshore wedge wire system that demands a connecting conduit(s) between the wedge wire screen assemblies and the onshore intake structure. Two alternative concepts are considered for this connecting conduit—offshore tunnel and multiple buried pipes.

3.6.1 Design Features of Wedge Wire Screens

Wedge wire screens have the ability to effectively minimize the impingement mortality and reduce entrainment with its inherent proper engineering design. The recommended slot through-flow velocity wedge wire screen system will not exceed 0.5 fps and therefore will meet the impingement reduction of the *California Once-Through Cooling Policy*. The general favorable design features of the wedge wire screen technology, which mostly are absent at existing open channel system, include:

- Wedge wire screen provides passive screening with no moving parts that could injure fish and fish larvae.

- Screen internal design provides a uniform flow velocity along the entire screen surface avoiding high-inlet velocity zones.
- The wedge shape of wires results in inward decelerating flow velocity avoiding suction of aquatic life.
- Screen through-flow velocity of 0.5 fps results in approach velocity adjacent to screen surface (say, 6 inches away) of less than 0.3 fps. Sea current velocity is normally above this value, thus, the sea current has more force to carry away the fish eggs and larvae than does the screen approach velocity.
- Screen design avoids formation of swirling flows around the screen, thus, not distressing aquatic life caused by this phenomenon.
- Wedge wire screens are installed above the sea bottom (for JUOTC approximately 8 feet) avoiding the impact to benthic life.
- The cylindrical shape of screen assists the lower 2/3 perimeter of the screen surface to stay clean for most types of foreign floating objects due to the downward gravity force effect and slow inlet design flow velocity.
- The wedge wire screen blockage is a deterrent to juvenile fish and fish larvae. The wedge wire screen does not have continuous openings like velocity cap or shoreline intake does, and, when combined with very low screen through-slot velocity, the solid portion of the wedge wire screen surface area acts as a deterrent to juvenile fish and fish larvae. The screen blockage as examples for a 6-millimeter slot size screen is approximately 40 percent, and for a 2-millimeter slot size screen, is approximately 70 percent.
- Relative to the existing intake system, the maximum size juvenile fish and fish larvae that can pass, as an example, through a 6-millimeter slot is less than 6 millimeters, meaning larger fish and larvae stay out all the time.
- For a specific water withdrawal requirement, the number of required wedge wire screens will change depending on the desired slot size. As an example, approximately twice as many screens are required for 2-millimeter slot screens compared to a 6-millimeter slot size screens for the same flow rate.
- The screen installation in deeper seas (approximately 30 to 40 feet water depth) helps screen to experience a substantially reduced wave action resulting in nearly uniform sea current velocity field around the screen.
- Cylindrical *T*-shaped wedge wire screens with end cones are installed parallel to the sea current assisting in diverting floating debris from the screen.
- Approximately 20 percent additional redundancy is required in the design (approximately four additional screens per unit for 6-millimeter slot size screens) to minimize operations and maintenance requirements.

The copper alloy screens produce leachate that will be fully evaluated through the licensing and permitting efforts and incorporated in the operation and maintenance of the plant. The following details are noted regarding the use of copper alloys for wedge wire screens:

- Only copper alloys will survive the seawater biofouling conditions, and other metals such as super duplex stainless steel, will experience biofouling resulting in clogging of the wedge wire slots and are not recommended.
- The copper alloys will have leachate and the amount of leaching rate generally reduces in time with time being measured in years (Race and Kelly, 1994).
- A permit amendment may be required to increase the leachate discharge limit.
- Different copper alloys induce different leachate rates and screen manufacturers provide the value for their proposed alloy.
- USACE engineers recommend for copper in saltwater a concentration value of 0.79 µg/l for biofouling control is adequate (Race and Kelly, 1994).

3.6.2 Impingement and Entrainment at Wedge Wire Screens

The design of wedge wire screens favors impingement and entrainment reductions in three ways: (1) the screen acts as a physical barrier, with no moving parts, prevents aquatic organisms sufficiently larger than the screen slot size from being entrained into the screen: (2) sweeping current in the source water tends to move the aquatic organisms away from the entrained flow field and reduce impingement by moving organisms past the screen faces, minimizing direct contact with intake; and (3) hydrodynamically enforced entrainment reduction of early life stages resulted from small through-slot velocity.

Juvenile fish and fish larvae sense the screens and avoid entrainment and they are less sensitive to the slot size. Zeitoun, et al. (Zeitoun, 1981) conducted field entrainment experiments with samples of ichthyoplankton collected through 2.0-millimeter and 9.5-millimeter slot opening cylindrical wedge wire screens in June, July, and August off the southeast shore of Lake Michigan at a depth of 10.7 meters. Ambient composition and density of ichthyoplankton were determined by net tows. Rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseudoharengus*), and yellow perch (*Perca flavescens*) larvae were common in both entrainment and tow collections. Eggs were found almost exclusively in entrainment collections. Ambient larval fish densities were approximately 11 times greater than those found in entrainment collections. Total entrainments through either screen (slot size) were not statistically significant. Larval avoidance and, to a lesser extent, screen exclusion, were responsible for the low entrainment. These field experiments estimated that approximately 90 percent of native fish larvae at the site avoided pumping.

Tenera Environmental performed the Open Ocean Intake Effects study, a pilot study for the evaluation of a narrow-slot cylindrical wedge wire screen (SCWR 2011). The pilot study examined the following operational characteristics of the screen in situ:

- Larval entrainment
- Impingement
- Screen corrosion/biofouling
- Hydrodynamics around the screen during pumping.

The pilot scale intake screen had a 2-millimeter slot opening and was sized to ensure a maximum through-screen velocity of 0.33 fps. Results of the pilot studies testing showed that Z-alloy proved to be resistant to biofouling over 13 months, and the qualitative evaluation of dye in water moving around the cylindrical wedge wire screens showed currents and wave motion helping to clean the screen. That, together with a low intake velocity, prevented impingement of small organisms. The intake effects assessment study as presented in the cited reference below compared the screened intake with an unscreened intake to study the operational effectiveness of the screen on larval entrainment. The data from the pump samples was analyzed to determine if any differences could be detected between concentration of fish, caridean shrimp, and cancrid carb larvae from the screened and unscreened intake. The analysis showed: (1) the standard 2-millimeter narrow-slot wedge wire screen intake screen excluded 100 percent of adult and juvenile fish species in the area, (2) the unscreened intake entrained juvenile and adult fishes, and (3) while no statistically significant reduction in entrainment was found, annualized screen-test results demonstrated that the screen resulted in 20 percent reduction in total annual fish entrainment.

Testing on effectiveness of various slot widths (0.5 millimeter, 1 millimeter, 2 millimeters, and 3 millimeters) was conducted and summarized (Dey 2003) on three species in the Hudson River Estuary—American shad, striped bass, and bay anchovy. Owing to their relatively large eggs, length at hatch, and rapid growth rates, all of these slot widths result in substantial reduction in the Age 1 equivalent American shad lost to entrainment. The shad entrainment reduction of 87-99 percent for the 3-millimeter slot width wedge wire screen as compare to 99 to 100 percent reduction with 0.5-millimeter slot width screens was measured. The striped bass exhibited greater variability in protection from entrainment across slot width and intake location, with entrainment reduction from 26 to 39 percent at 3-millimeter slot width to 97-99 percent at 0.5-millimeter slot width.

Enercon conducted alternative intake technologies evaluation for Indian Point 2 &3 (Enercon 2010) and concluded that use of the wedge wire screens can be effective in reducing entrainment loss up to 89.8 percent and impingement loss up to 99.9 percent from the regulatory baseline. It also concluded that use of both 2-millimeter slot and 9-millimeter slot would achieve substantial EA1 (Equivalent Age 1) impingement and entrainment reduction. EA1 is defined as the number of age 1 fish that eggs, larvae, and juveniles lost to entrainment would have been expected to produce had they not been entrained. Potential percent reduction of annual EA1 impingement and entrainment losses from the regulatory baseline due to use of wedge wire screens in each month with through slot velocity of 0.5 fps are practically the same, ranging from 88.8 to 89.8 percent, for slot sizes of 1 millimeter, 1.5 millimeters, 2 millimeters, 3 mm, 6 millimeters and 9 millimeters. In addition, parallel orientation of cylindrical wedge wire screen with flow current and magnitude of the current velocity and higher have a considerable effect on reducing the entrainment. Alden Research Laboratory (Amaral, 2003) experiments demonstrated that the flow currents at or above screen-through velocity substantially reduced the entrainment with higher the ratio of the sea current to screen velocity the lower the entrainment.

Findings of various references demonstrate effectiveness in reducing entrainment and impingement losses. On the entrainment reduction side, narrow slot size (2 millimeters or lower) perform the same or better than larger slot size screens (above 2-millimeter opening). However, actual quantification impacts to the in situ aquatic organism conditions for the plant need to be conducted before a conclusion is drawn on the optimum slot opening (whether 2-millimeter slot or 6-millimeter slot, see Section 4.2.5). This certainly needs to consider the potential effect of debris clogging and fouling to the operation of wedge wire screens.

3.6.3 Alternative Concept A: Offshore Tunnel

The offshore tunnel intake system alternative consists of the following components:

- A common drop shaft (main shaft) constructed nearshore in the enclosed shoreline basin.
- An offshore rock tunnel of 30 to 32 feet diameter, connecting the main shaft to the offshore drop shafts.
- Minimum of six offshore drop shafts to support installation of offshore wedge wire screen assemblies.
- Minimum of six offshore wedge wire assemblies, one for each drop shaft, to supply filtered water to drop shafts.
- An enclosed shoreline basin constructed by extending the existing inner breakwater.

Figures WW-A-1 through WW-A-3 show the schematic arrangement of this alternative, which includes a 30- to 32-foot-diameter rock tunnel that will be constructed using a tunnel boring machine to connect the main drop shaft to the offshore drop shafts. The offshore tunnel length will be approximately 1800 feet, depending on the bathymetry and depth requirements. While the lining requirement for the tunnel will depend on the rock conditions encountered, the tunnel will be assumed to be unlined at this stage of the assessment. The main drop shaft diameter will be similar to that for the tunnel to provide access for the tunnel boring machine. Ultimately, this shaft will be used as seawater supply conduit. A construction access shaft (not shown in the figures) may be required to facilitate construction sequencing. The depth of the tunnel below seabed and its alignment will be based on local geological conditions.

The common main shaft will be used to convey the filtered seawater collected from the offshore wedge wire assemblies to the shoreline basin through the underground rock tunnel. The offshore drop shafts (a minimum of 6) that receive water from wedge wire screen assemblies will be constructed using barge-based marine drill operation or erected in dry condition inside a temporary cofferdam, as applicable. The tie-in of the drop shaft to the underground tunnel will be made after the tunnel is completed. The offshore drop shafts will have an effective 12-foot inside diameter.

The shoreline basin will be constructed by extending the existing inner breakwater westward and closing the intake cove from direct contact with the open sea. The only connection of the basin to the sea will be through the tunnel, unless emergency gates, valves, or openings are added to ensure the continued supply of water supply to the intake to maintain the safe operation of the auxiliary saltwater pumps if screen clogging is imminent under high-debris loading condition.

3.6.4 Alternative Concept B: Multiple Offshore Buried Pipes

This alternative consists of multiple offshore buried pipes, which collectively supply water to a shoreline basin formed by the breakwater enclosure. Each buried pipe will be connective to its own dedicated offshore wedge wire assembly.

The components of this alternative concept are:

- Minimum of 9 offshore buried pipes conveying filtered water to the shoreline basin.
- Minimum of 9 offshore wedge wire assemblies, one per each offshore pipe.
- An enclosed shoreline basin constructed by extending the existing inner breakwater.

Figures WW-B-1 through WW-B-3 show the schematic arrangement of the buried pipe alternative. The off-shore buried pipes will each have an inside diameter of approximately 10 feet and be connected to five screens. The number and diameter of buried pipes depends on number of screens per pipe. Pipe diameter can be reduced by increasing the number of buried pipes (for example, twenty 7-foot-diameter buried pipes with two screens per pipe). An optimization evaluation will need to be conducted in Phase 2 to determine the diameter and number of buried pipes based on additional geotechnical data and constructability investigations. The pipes will be buried in clusters of three per trench to minimize sea bottom excavation requirements. The pipes will pass underneath of the breakwater supplying filtered water to the enclosed basin. On the discharge side, each set of wedge wire screens is served by a common discharge pipe and each pipe will have one common discharge box to mitigate erosion concerns as the water enters the basin.

The shoreline basin will be constructed by extending the existing inner breakwater westward, which will close the intake cove from direct contact with the open sea. The only connection of this basin to the sea will be through buried pipes. Similar to the tunnel alternative, emergency gates, valves, or openings could be added to ensure the continued supply of water to the intake to maintain the safe operation of the service water pumps if screen clogging is imminent under high-debris load conditions.

3.6.5 Wedge Wire Screens Requirements

The wedge wire screens considered for this evaluation are circular cylinder screens of 8 feet in diameter. The 8-foot screen is currently the largest size available that boasts some operating experience. Considering the large cooling water withdrawal flow requirement, the high-capacity/high-performance screens are recommended to achieve a more evenly distributed flow across the screen face. The design will be based on a maximum slot flow-through velocity of 0.5 fps. Due to potential debris loading in a marine environment, the slot size considered is 6 millimeters to minimize screen clogging. Smaller slot sizes such as a 2-millimeter slot will be considered, but its use will increase the potential for screens blockage. In addition, when screen slot sizes reduce, the number of screens required will increase greatly. As an example, approximately twice as many screens are required for 2-millimeter slot screens compared to a 6-millimeter slot size screen for the same flow rate. In situ screen testing should be conducted for both 2-millimeter slot and 6-millimetr slot, by evaluating the entrainment and impingement reduction performance versus debris clogging and biofouling potentials.

A minimum of 36 screens (not including any redundancy) for 6-millimeter slot screens will be required to supply cooling water flow for the two units. The *T*-shaped, high-capacity/high-performance wedge wire screens design ensures uniform flow across the screen surface due to permanently placed internal flow modifiers. The screen material would be based on copper-nickel alloy that has demonstrated resistance to biofouling. The screen arrays will be arranged in the prevailing direction of the ocean current to effectively sweep the screen surfaces.

Warning buoys will be installed in the area to avoid shipping impact. To reduce entrainment and impingement impacts, the screens will be located in areas that are less biologically productive. Cooling water will enter each screen through slots with a slot through-flow velocity of less than 0.5 fps, thus satisfying impingement criterion for the *California Once-Through Cooling Policy* rule. This velocity is sufficiently low relative to the strong sea currents and will enable local adult and juvenile fish to swim safely from the screen area.

3.6.6 Comparison of Wedge Wire Alternatives

Constructability and plant downtime are the main drivers for providing two alternatives. Each alternative will need to be investigated in more detail in Phase 2 of this study (see Section 3.6.7). The DCPP site has a fractured rocky shoreline with a bathymetry characterized by a sloping bedrock bottom with steep relief, rocky pinnacles, and prominent rocky ridges (Tetra Tech 2002). This condition dictates that tunneling may be more preferable than the cut-and-fill method. When considering plant downtime, it appears that the tunneling scheme may be the more expeditious installation method, since tunneling and installing of drop shaft efforts will not affect existing plant operation until the closing of the breakwater. Detailed offshore geotechnical investigation and detail construction method evaluation in Phase 2 of the study may be pursued to select the most viable option.

Both alternatives will have similar environmental compliance and similar operations and maintenance issues but construction methods differ.

3.6.7 Final Wedge Wire Technology Selection

Although the wedge wire screen technology is effective in minimizing the impingement and reducing entrainment loss of juvenile and adult fish due to physical barriers afforded by the wires, the efficacy is site-specific depending on the evaluation of several positive and negative factors. Such factors may include an abundance of aquatic organisms, temporal and spatial distribution of aquatic species and their life stages present in the water source, hydrodynamic conditions, inherent screen design, and screen arrangement and placement of screen assemblies. A definitive demonstration of the entrainment benefit of using wedge wire screens in meeting the requirements of the *California Once-Through-Cooling Policy* will require site-specific field testing, and potentially in conjunction with model analyses.

Use of offshore wedge wire screens at the DCPP site, with the total amounts of cooling water requirements, can be considered a first-of-a-kind technology to some degree. Consequently, a due diligence survey and field testing investigation will be performed before final recommendation and implementation of this technology. The following efforts should be considered as a part of this multidisciplinary investigation:

- Historic operating plant data needs to be collected. Historic data to include records, photos, reports, and fact sheets to understand 20-plus years of operating experience.
- Nearby plant experiences using wedge wire screens will be collected and evaluated (if any).
- Aquatic field survey of sea bottom will be performed to identify the suitable location for placement of screens and to minimize biologically sensitive and production areas.
- If not available, perform hydrographic survey for proper evaluation of local hydrodynamics of the source water to facilitate the effectiveness of reduction mechanisms afforded by the screens.
- In situ testing of two screens sizes (for example, 2 millimeters and 6 millimeters) at each site is necessary and essential to evaluate entrainment, impingement, and debris effects on the screen's performance.
- Material of construction and slot size will be field tested.
- Hydrodynamic, geological, geotechnical, constructability, and safety evaluation of the proposed system.

Upon complete evaluation of the due diligence survey, physical field testing, and engineering and constructability investigations, the suitable slot size and material can be finalized and its impact on the aquatic life will be evaluated.

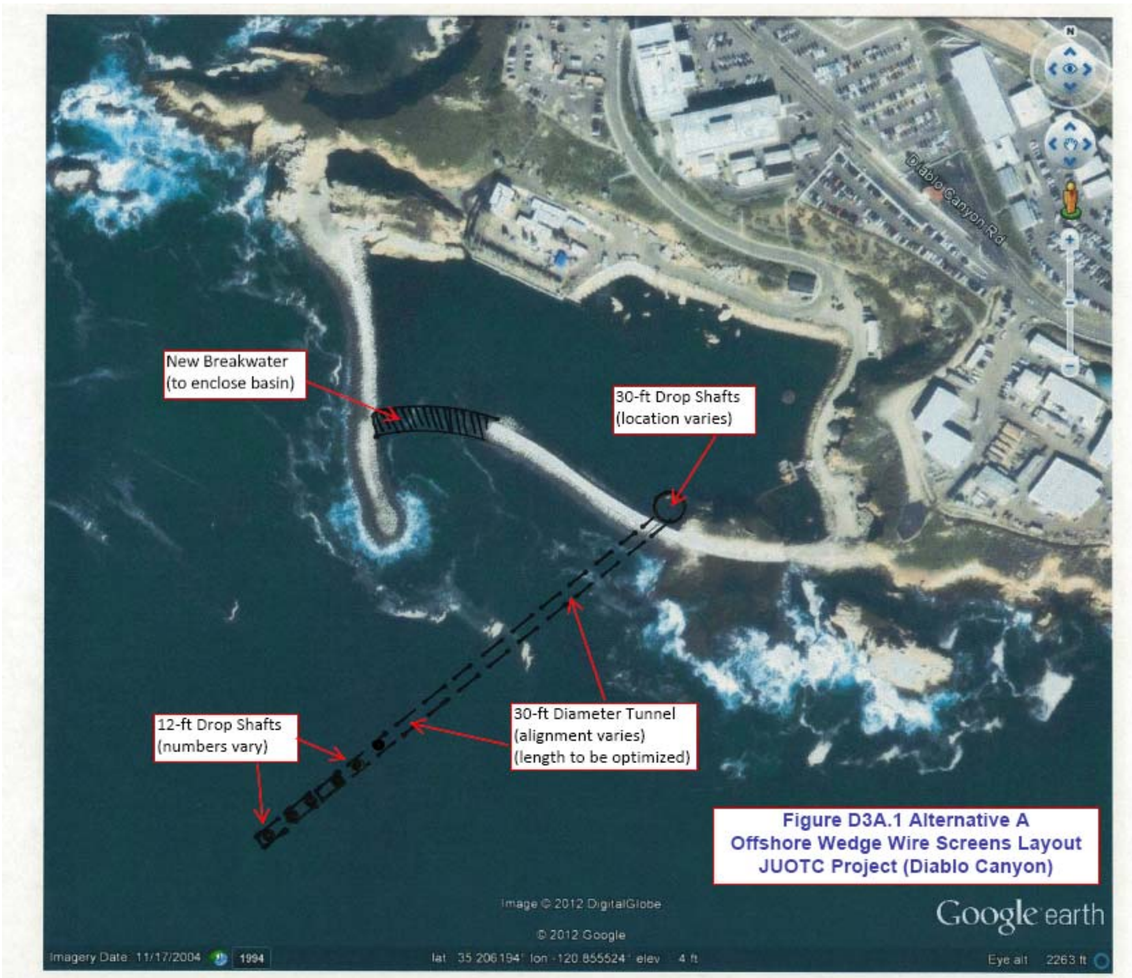
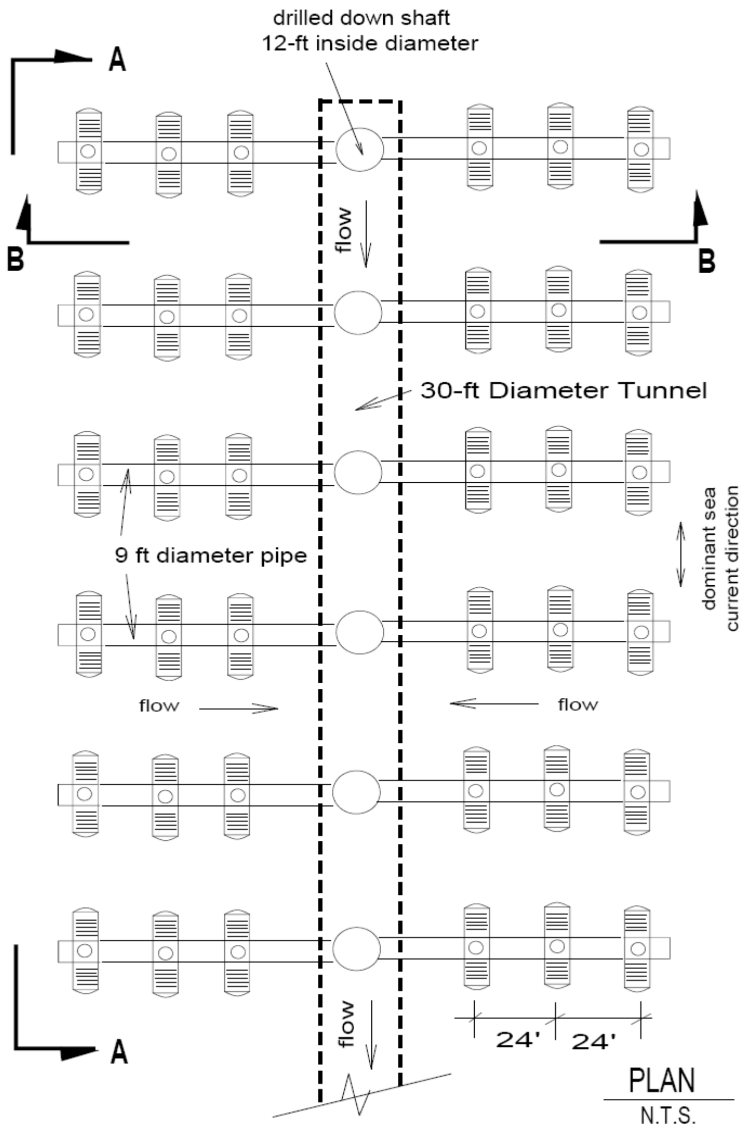


Figure WW-A-1. *Alternative A — Offshore Wedge Wire Screens Layout*



Notes:

1. MinimumThirty Six (36) 8-ft diameter Wedge-Wire Tee-Screens
2. Use of high capacity tee-screens with enhanced flow modifiers.
3. The design flow is 1.75 million gpm.
4. Riprap placement on area over buried pipes and under the screens.

Figure WW-A-2. *Offshore Wedge Wire Screen Intake System (Alternative A)*

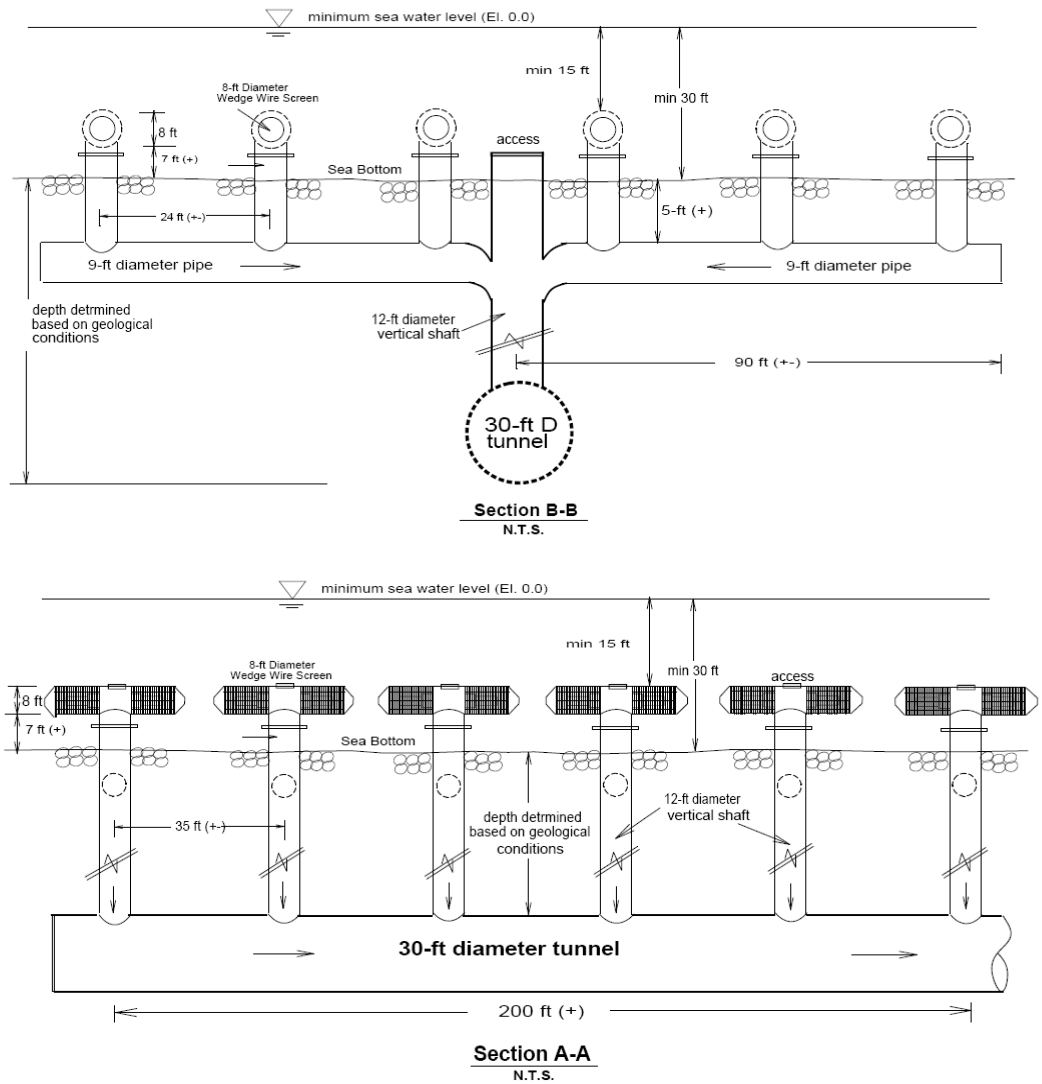


Figure WW-A-3. *Sectional View of Wedge Wire Screen Intake Assembly (Alternative A)*

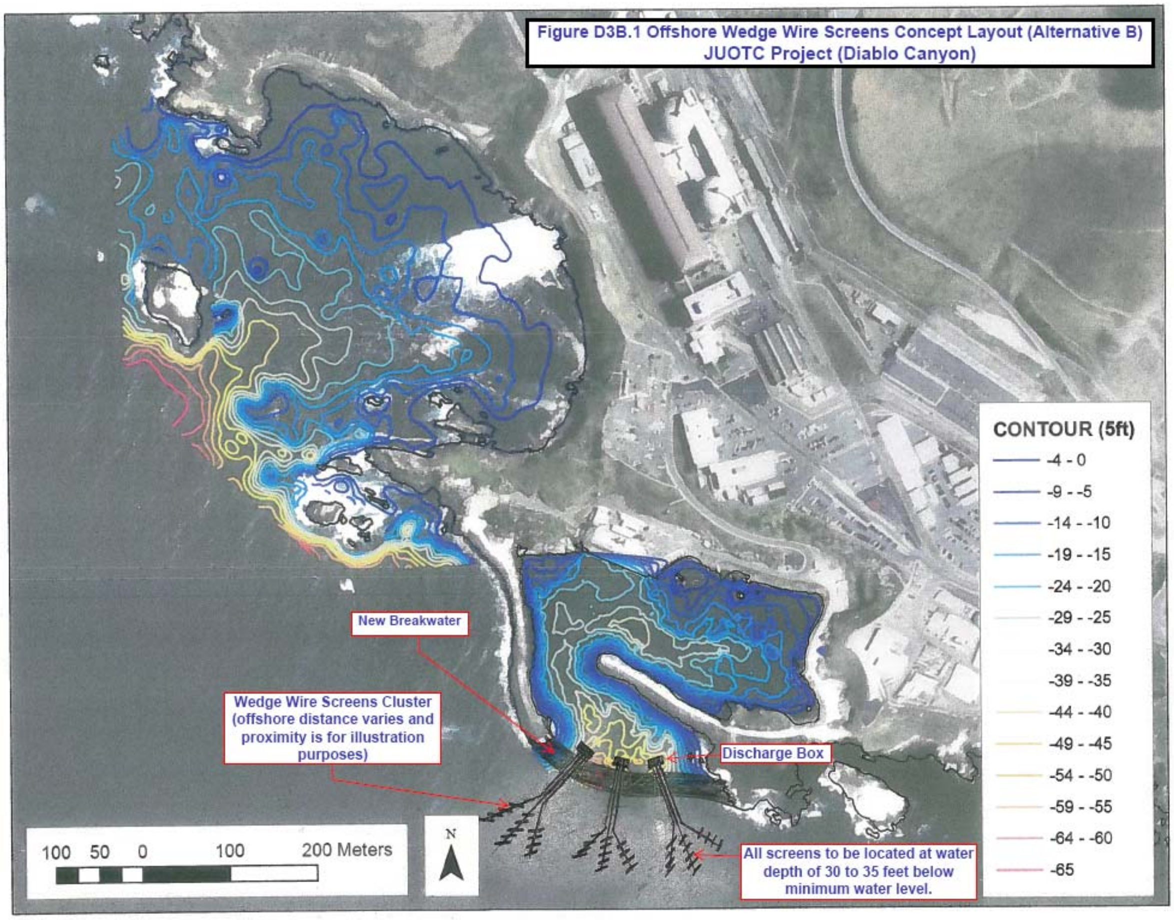


Figure WW-B-1. Offshore Wedge Wire Screens Concept Layout (Alternative B)

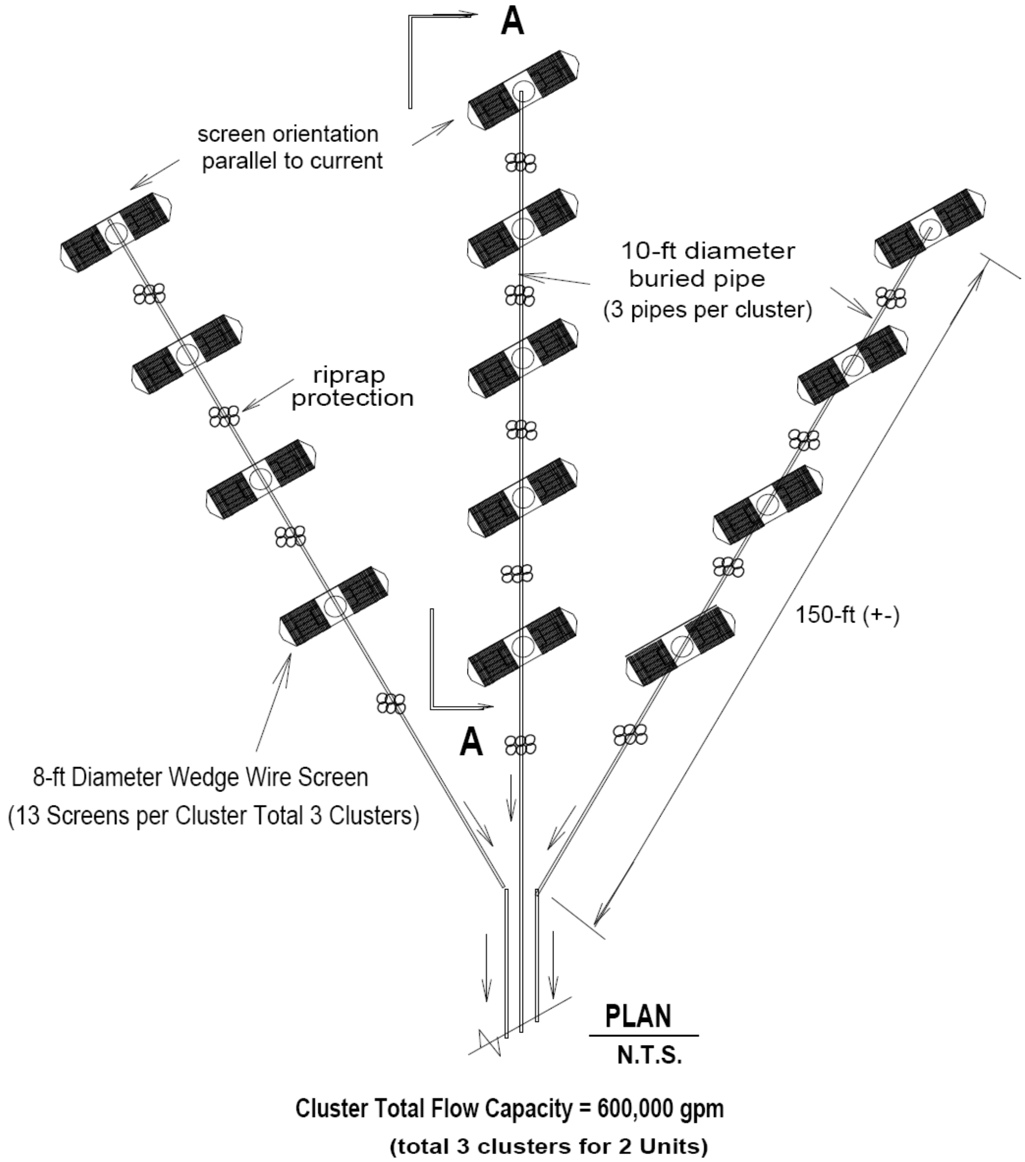


Figure WW-B-2. *Layout for One Offshore Wedge Wire Screen Intake Cluster (Alternative B)*

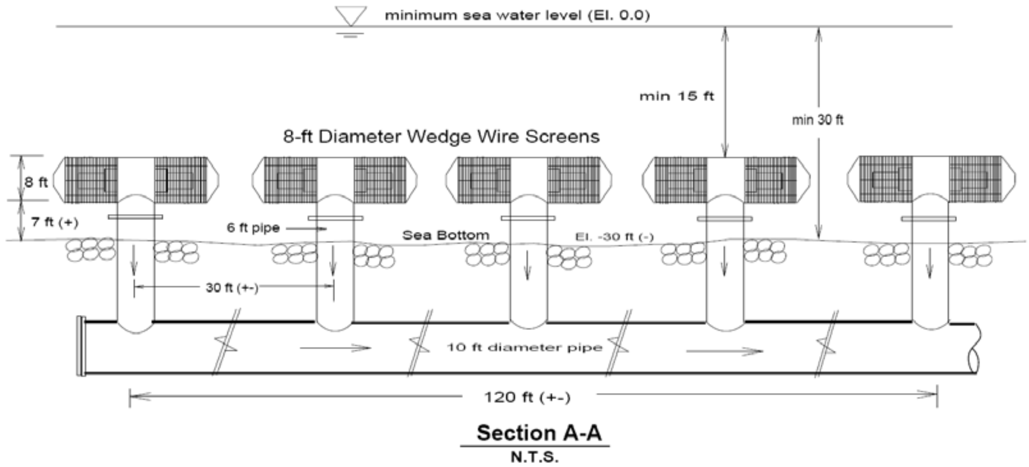


Figure WW-B-3. Sectional View of Wedge Wire Screen Intake Modular Assembly (Alternative B)

3.7 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

3.7.1 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 the 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: (1) a reduction in plant load, (2) an increase in condenser temperature rise, and (3) selective flow reduction in response to temporal fluctuation of aquatic abundance in the source water (for example, during fish spawning seasons). As shown in Section 4.2.8, the percent of condenser flow reduction (about the same as the percent intake flow reduction) equals approximately the percent of plant unit de-rating, with the condenser temperature rise remains constant.

DCPP is a baseload 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.

Because DCPP is a baseloaded 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 the 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 *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 support the plant operational needs. Additionally, 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 4.2.6.

3.7.2 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:

- *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).

- *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 totally ineffective for colder water.

- *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.

- *Vibration and Strobe Lights Deterrence* A technical report on use of this type of fish deterrents was published by University of California at Davis (2010) for California Energy Commission in investigating fish's ability to avoid screens and louvers using vibrations and strobe lights as deterrents.

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.

3.8 Source Water Substrate Filtering/Collection Systems

The source water substrate filtering collection system, also referred to as an infiltration intake, is an unconventional intake design and that, to our knowledge, has not been applied to such a large once-through cooling system. It has been used, however, for cooling tower makeup water systems, with intake flow rates that are typically a fraction of the once-through cooling flow rates. A typical arrangement of this type of intake consists of a set of horizontal laterals constructed of perforated or slotted pipe that are placed below the seafloor in a bed of porous media. The laterals are connected via a manifold to a pump intake forebay that is part of the cooling water system.

The advantages of the substrate filtering collection system include following:

- It can be applied to shallow water near the shoreline.
- The flow capacity is relatively unaffected by tidal influences.
- The turbidity of the produced water is low and relatively constant.
- Entrainment and impingement of aquatic organisms and debris are eliminated.

However, the disadvantages are:

- Clogging of porous media (filtered media such as gravel or sand) due to vegetation growth, silt/clay and bio-growth, can lead to reduced or stopped flow to the connecting manifolds after certain period of operation.

- With horizontal laterals buried under the sea bottom, it is difficult to know whether a lateral is flowing with water or clogged.

- For a vast field of laterals for a once-through cooling application, the vast number of laterals may make the maintenance cleaning using hydraulic jet or brushes not practical.

- From day one of the operation, the available efficiency of laterals is only decreasing. There is no assurance if the remaining efficiency of laterals can maintain adequate flow after a period of operation, which could lead to forced plant shutdown.

There is another type of source water collection system called vertical wells (either conventional wells or radial collector wells). However, the source water substrate filtering collection system is more efficient for production of large quantities of water as compared to onshore wells (either conventional vertical wells or radial collector wells). Conventional vertical wells are placed in vertically oriented boreholes and consist of a well screen and blank casing. In general, the maximum yield of a typical vertical well is approximately 6,000 gpm for a 30-inch diameter well (Sterrett, 2007), which is about the practical well size limit of conventional drilling equipment. For a 1.7 million gpm design capacity, approximately 280 vertical wells and associated pumping stations would be required if the maximum yield exists from each well. This maximum yield assumes that a highly permeable material, such as a gravel deposit, is present in the subsurface, which is not the case at DCPP; hence the total number of vertical wells needed to meet the design flow rate capacity would be significantly greater than 280. The vast network of pumping skids delivering flows to a central collection point will not be practical onshore. Radial collector wells (also known by the proprietary name Ranney Wells) consist of a central caisson and associated pumping skid, with well screens extending laterally outward beneath the water source. Radial collector wells have been designed with capacities from 2 to 80 mgd (Riegert, 2006) or 1,400 to 56,000 gpm. Using this range of capacity, it would require between 30 to 1400 radial collector wells and associated pumping installations to meet the design flow rate capacity, assuming ideal subsurface conditions, that is, a gravel deposit. The subsurface conditions at DCPP suggest that high numbers of radial collector wells would be required and the vast network of pumping skids delivering flows to a central collection point will also not be practical onshore.

Onshore vertical and radial collector wells have the following limitations:

- Greater horizontal spacing requirements to reduce interference effects between conventional wells or to allow lateral placement for radial collector wells.
- Greater vertical penetration to produce optimum flow to well.
- Well production rate limited to natural formation hydraulic conductivity.
- Geological conditions at DCPP indicate the presence of shallow bedrock not conducive to large flows.

These limitations would be expected to result in a larger well field area and a more complex pumping system and on an onshore installation, and it is not really practical. As a result, the vertical or radial collector wells were not considered in this evaluation.

3.8.1 Conceptual Design

Two configurations of the substrate filtering collection system have been considered for this evaluation: the natural (beach) filter system and the artificial (beach + filter) filter system. The natural substrate filter system uses the native substrate (that is, offshore deposits of beach sand or gravel) as backfill around the horizontal laterals. The artificial substrate filter system uses an engineered filter media (that is, clean sand or gravel) to replace the native substrate around the horizontal laterals to enhance seawater infiltration. Figure SWS-1 presents a general conceptual layout and Figures SWS-2 and SWS-3 illustrate the two configurations.

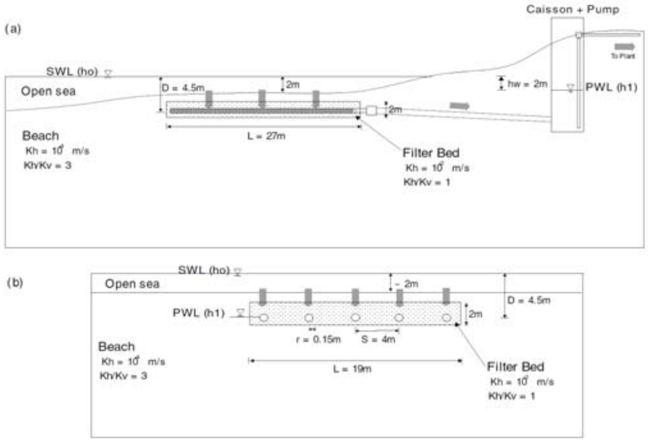


Figure SWS-1. *Conceptual Layout of a Typical Substrate Filtering Collection System (Taylor and Headland, 2005)*

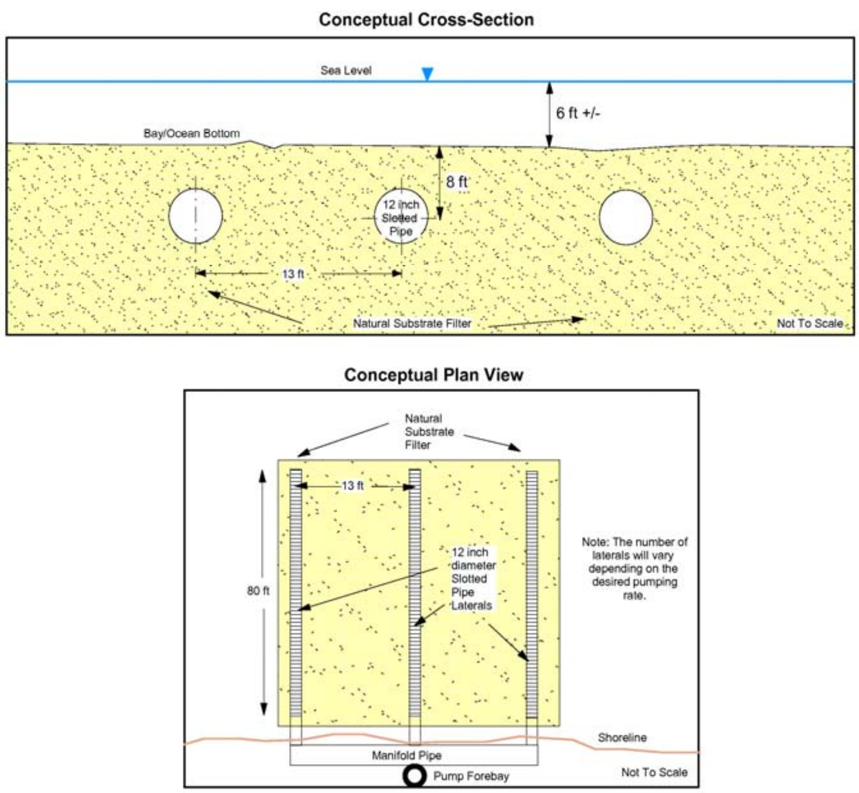


Figure SWS-2*. Natural Substrate (Beach) Filtering Collection System Conceptual Design*

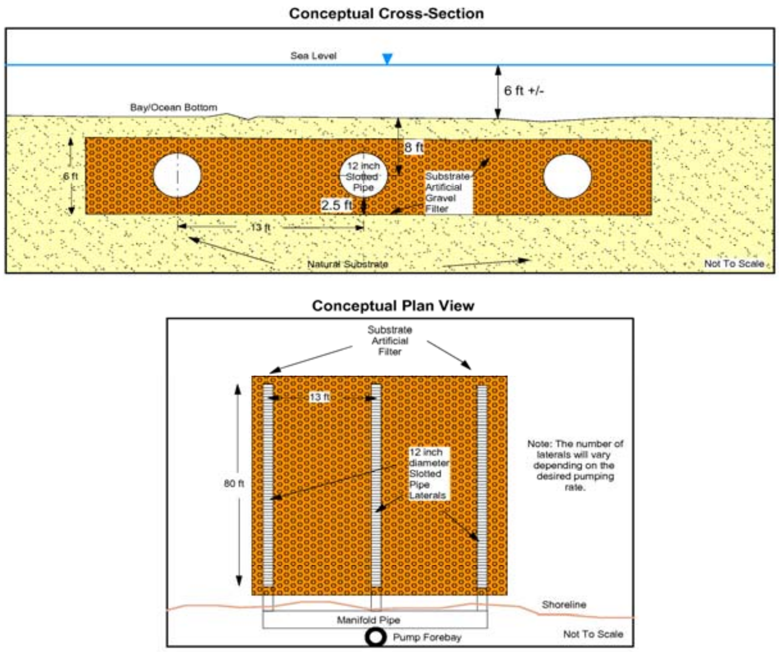


Figure SWS-3.
Artificial Substrate (Beach + Filter) Filtering Collection System Conceptual Design

The natural filter system is used in areas where the natural substrate (offshore deposits of sand and gravel) has the desired material properties (hydraulic conductivity) for the required flow to filter through the substrate at a reasonable rate. This serves to limit the need to increase the laterals area. The artificial filter system is useful in areas where the natural substrate (offshore deposits) has lower hydraulic conductivity (reduced flow velocity) because of its fine particles (silts and clays) in the material. In this case, the natural substrate is removed and an artificial filter of sand or gravel is placed as backfill over the horizontal laterals. This increases the local flow velocities, thereby minimizing the areal extent of laterals. The permeability of the substrate, both natural and artificial, along with the design inflow rate for the cooling system is the primary factor that determines the number of required laterals.

To evaluate the engineering requirements for the implementation of this technology, the hydraulic design criteria developed by Taylor and Headland (2005) for the substrate filtering collection system conceptual design using a variety of substrate and artificial filter parameters are adopted. These parameters include the horizontal hydraulic conductivity of the substrate (K_h), the vertical anisotropy ratio (ratio of horizontal to vertical hydraulic conductivity K_h/K_v) of the substrate, lateral length (L), lateral burial depth, lateral spacing (S), lateral radius (r), and head difference across the system (dh) as shown in Figure SWS-1. These parameters were used with a groundwater model to develop a family of design charts for various pumping rates, horizontal hydraulic conductivities, vertical anisotropy ratios, and head differences (Taylor and Headland, 2005). Figures SWS-4 and SWS-5 show the charts for an anisotropy ratio of 10 (horizontal hydraulic conductivity is 10 times the vertical hydraulic conductivity), which is typical of natural materials. It should be noted that the anisotropy ratio of the artificial filter is maintained at one (horizontal and vertical hydraulic conductivities are the same) with a fixed horizontal hydraulic conductivity of 1 x 10^{-2} m/s (2800 ft/d) that is typical of coarse gravel. For the artificial filter deign, the hydraulic properties of both the engineered filter media and that of the surrounding natural substrate are considered in the design.

3.8.2 Design Considerations

The design considerations for the substrate filtering collection system include the following:

- Site-specific hydraulic conductivity testing for the substrate will be required.
- Substrate is not suitable for shallow (less than 10 feet) bedrock areas due to excavation difficulty; however, there are other excavation technologies, such as horizontal drilling, that can support installation.
- Additional permitting for spoils disposal associated with the artificial filter system will be required.
- Substrate installation may require custom marine excavating equipment depending on site conditions.
- The local availability of material for artificial filter system may be a concern.
- Substrate installation may require a long-term prevention and maintenance program to limit vegetation growing over the substrate filtering collection system that could lead to a reduction in the permeability of the sea floor material above the laterals area.

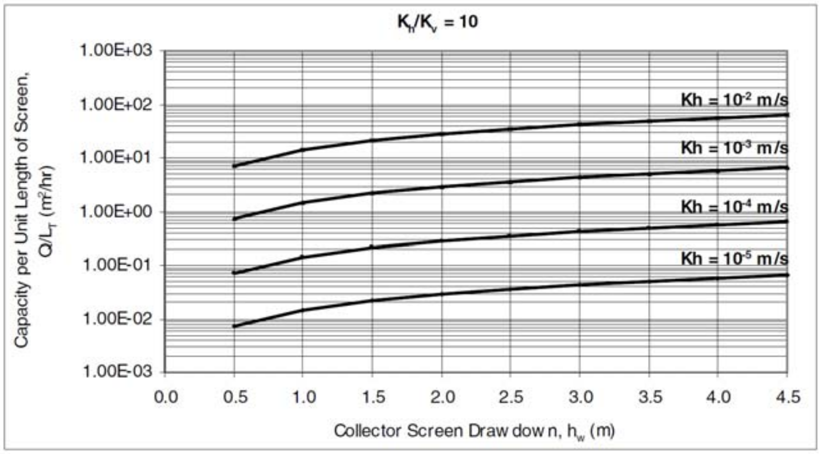
A network of suction piping connects various offshore horizontal laterals to the shoreline pump intake with the intake cove opening closed out. The high head differential across the system will likely require the addition of a new pump forebay connected to a suction pipeline so that the cooling water pumps can have sufficient submergence and net positive suction head for continuous reliable operation.

3.8.3 Conceptual Design Assumptions

The following assumptions are used in the DCPP conceptual design:

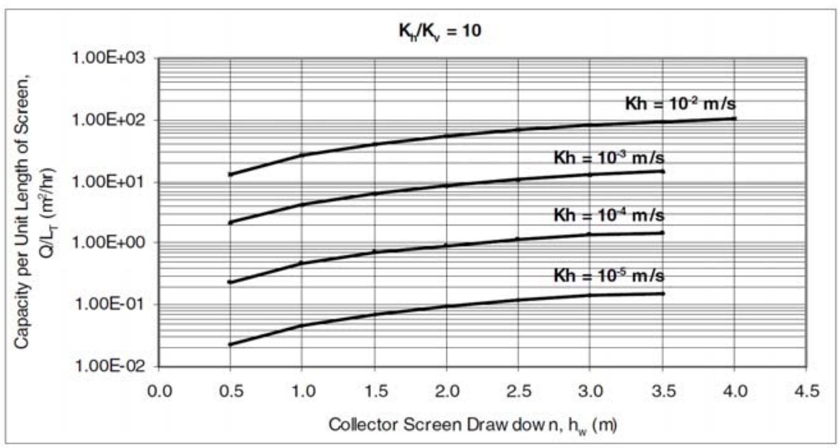
Parameter	English Units	Metric Units
Flow Demand (Q_d)	1,753,000 gpm	398,106 m^3/hr
Horizontal hydraulic conductivity (K_h)	28 to 280 ft/d	1 x 10^{-4} to 1 x 10^{-3} m/s
Anisotropy Ratio (K_h/K_v)	10	10
Lateral length (L)	80 ft	25 m
Lateral spacing (S)	13 ft	4 m
Lateral area (L×S)	1,040 ft^2	100 m^2
Head difference across system (h_w)	11.5 ft	3.5 m

The range of horizontal hydraulic conductivities selected represents typical values for beach sands. Using the charts on Figures SWS-4 and SWS-5, the resulting infiltration area needed to produce the required flow are listed in the table below:



K_h/K_v = 10 (anisotropy ratio)
Natural Substrate Filtering Collection System
After Taylor and Headland, 2005

Figure SWS-4. *Conceptual Design Chart for Natural Substrate Filtering Collection System*



K_h/K_v = 10 (anisotropy ratio)
Artificial Substrate Filtering Collection System
After Taylor and Headland, 2005

K_h values shown on the chart are for the substrate, K_h of artificial filter = 1 x 10^{-2} m/s with a K_h/K_v = 1

Figure SWS-5. *Conceptual Design Chart for Artificial Substrate Filtering Collection System*

Intake Type	Horizontal hydraulic conductivity of substrate K_h (m/s)	Flow per unit length of lateral Q/L_T (m^2/hr)	Total length of lateral $Q_d/(Q/L_T) = L_\Sigma$ (m)	Number of laterals needed - N $L_\Sigma/25$ (m)	Infiltration area N x 100 m^2 (m^2)	Infiltration area (acres)
Natural	1×10^{-4}	0.5	796,200	31,850	3,185,000	787
Natural	1×10^{-3}	5	79,620	3,185	318,500	79
Artificial*	1×10^{-4}	1.5	265,400	10,600	1,061,600	262
Artificial*	1×10^{-3}	15	26,540	1,060	106,160	26

*Artificial filter consists of coarse gravel with a $K_h = 1 \times 10^{-2}$ m/s and an anisotropy ratio of 1

To develop the type curves shown in Figure SWS-5, the horizontal hydraulic conductivity of the artificial filter bed surrounding the laterals (shown in Figure SWS-3) are kept at a constant value of 1×10^{-2} m/s with anisotropy of 1 (that is, horizontal and vertical hydraulic conductivity of the artificial filer bed to be equal). Whereas, the natural substrate filter was varied to develop the type curves in Figure SWS-5. Based on the preliminary sensitivity analyses using the type curves presented in Taylor and Headland (2005), the area required for the substrate filtration collection system would range from 26 acres (106,160 m^2) to 787 acres (3,185,000 m^2) depending on the actual substrate horizontal hydraulic conductivity and whether the artificial or natural filtration system is used. This, however, is based on a 100 percent efficiency.

Figure SWS-6 presents a conceptual location of the area where the substrate filtration collection system may be located. The preliminary location is close to a mile away from the rocky shoreline (assuming the substrate close to the shoreline to be rocky and assuming the potential area for the substrate laterals to have unstratified sand and gravel). The locations are preliminary and the layout of the laterals has not been specifically delineated. The final locations and geometry of the actual size can be determined after the required site-specific tests and studies (geologic, hydrogeologic, and geophysical) are performed.

Figure SWS-6 shows the upper bound of the areas needed for lateral placement when using natural substrate material (787 acres) and artificial substrate material (262 acres). These areas are based on the assumption that the substrate laterals are 100 percent efficient and that the differential head and other design parameters remain constant. However, the efficiency of the laterals could be less (due to potential plugging of the laterals over time) resulting in the need for a greater number of laterals and the associated increase in offshore impacts. If it is assumed that the laterals are 50 percent efficient over the operational life of the plant, then the size of the area and the laterals will be two times greater than the initial estimates presented earlier. This initial estimate is also based on the assumption that the flow across the laterals is uniform and the head in the laterals does not vary along the length. The flows and heads across the laterals, however, could be nonlinear, which results in dynamic head differential while pumping from a caisson, and the need for additional laterals to account for the reduction in efficiency. In addition, flow balancing to each horizontal lateral will be difficult because a large network of manifolds fan out to receive flow from laterals and then converge to a central pump forebay. This condition will result in laterals located far away from the main manifold/piping to receive less flow than laterals closer to the main manifold/piping, which can ultimately cause flow stoppage through those laterals, reducing overall efficiency of the substrate intake system.

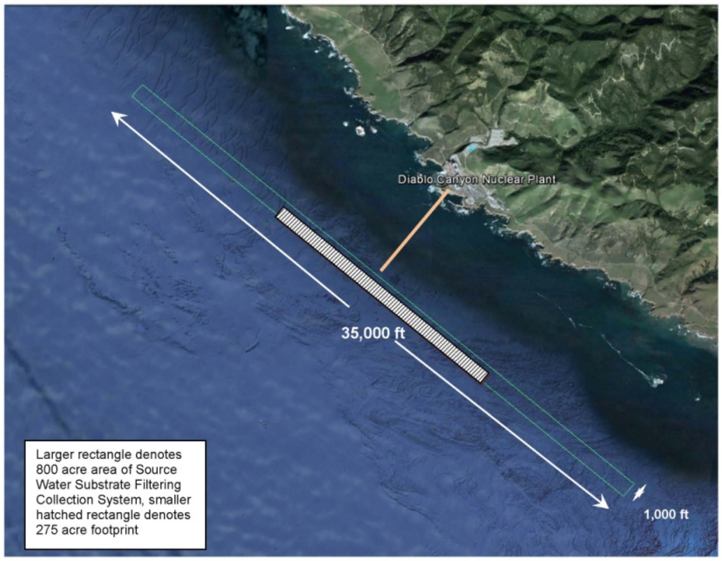


Figure SWS-6. *Conceptual Layout of Source Water Substrate Filtering Collection System at DCPP*

Note: Figure SWS-6 is a conceptual representation of a substrate filtering collection system. Actual location and areal extent of the system may be different than that presented. Multiple design approaches are possible than that of the rectangle area shown in the figure depending on the offshore conditions at DCPP and regulatory requirements.

The seafloor sediment conditions at DCPP may not be conducive to the installation of this type of system. Harrison (1987), summarizing Lillevang's Basin Intake Report states that sea floor "is a confused jumble of holes, pinnacles, trenches and short, wall-line formations of the harder strata in the steeply tilted formation." Thus, excavation for the laterals may be difficult in this terrain. In addition, occurrence of submarine landslides and vegetation growth should be further investigated to determine the feasibility of implementing this technology at DCPP.

3.9 Variable Speed Cooling Water Pumping Systems

A variable frequency drive or variable speed pump allows the pump to adjust its speed such that the intake system can operate over a range of water withdrawal rates. The need to vary withdrawal flow typically occurs in response to reduced demands on generation load or to match the optimal cooling water flow rate that is required for the system to operate efficiently within its thermal limits. Depending on the intake water temperature, condenser efficiency/back pressure, and power output, the required circulating flow rate may vary for different seasons of the year, particularly between winter/spring and summer. The intake system and the rated flow of the cooling water pumps are typically designed for peak load and summer month conditions. During winter/spring and other off-peak months, the intake cooling water temperature tends to be lower than the design condition, and there will be less demand on the generation load. As a result, the cooling water flow demand will be lower. A variable frequency drive or variable speed pump system has the ability to match the seasonal variation in the cooling water flow demand instead of requiring the system to be pumping constantly at or near the design flow year round.

Currently, both DCPP Units 1 and 2 are baseload units and do not vary load on a daily basis. To determine the ability of variable speed pump technology to reduce impingement mortality and entrainment loss, in compliance with the *California Once-Through Cooling Policy* rules, one needs to recognize that the range of flow reduction most current large-capacity variable speed pumps can achieve is on the order of 15 to 30 percent.

According to published studies on the subject, a proportional relationship between reduction of flow and reduction of entrainment exists for a specific withdrawal location, that is, the percent of flow reduction approximates the percent of entrainment reduction. The potential of intake flow reduction with the use of variable speed cooling water pumps at DCPP, therefore, implies a similar improvement on entrainment loss. The correlation with impingement mortality is not as well defined as impingement reduction, which is related to the decreased number of organisms potentially coming into contact with the components (such as the screens) of intake structure or related to the reduced withdrawal rate and the associated decreased impingement velocity. For this evaluation, a proportional reduction of impingement mortality and flow reduction is assumed.

The specific generation output under different de-rating scenarios versus condenser flow can be determined based on acceptable condenser back-pressure, design condenser inlet temperature, and condenser cleanliness factor. However, the calculated generation outputs for different condenser flow rate will show a much higher condenser temperature rise with reduced flow as compared to the baseload condition. For this assessment, it is necessary that the condenser temperature rise be kept constant for different plant de-rating conditions, so as not to cause thermal discharge permitting and thermal impacts issue at discharge. In such a case, the amount of plant de-rate will closely match the amount of condenser flow reduction as described above and the resulting entrainment reduction.

Implementation of this technology would not involve any change to the auxiliary saltwater pumps and associated intake bays. There would be no impact to the safe operation of auxiliary saltwater pumps.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 Closed-Cycle Cooling Systems

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of the various closed-cycle cooling system technologies under consideration, as described in Section 3.

This 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) for the closed cooling cycle technologies.

The applicability of each permit or approval to the various closed-cycle system and water supply options was evaluated. Those deemed applicable were then scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria that would preclude the permit or approval from ever being issued or granted for a particular closed-cycle system and water supply option. In other words, the principle characteristics of each closed-cycle cooling system and water supply option were assessed to determine if any posed an insurmountable barrier to its acceptance in each applicable permit/approval regulatory review process. Any conclusive barrier would preclude the closed-cycle cooling system/water supply option from further consideration in Phase 2 of the study. The identification of insurmountable barriers was difficult because the representatives of the various permitting agencies were reluctant to categorically discount-specific cooling system technology options if they offered some tangible benefits to the protection of marine resources even in the face of other less desirable environmental impacts.

The assessment also focused on identifying the critical path (longest duration) initial preconstruction permitting processes, that is, those that support site mobilization, physical site access, and initial earthwork/foundations for each 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 that support later stages of construction and operation that are not critical path to the commencement of construction were also included in the assessment since these items could pose significant operational constraints to future DCPP operations.

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

The following regulatory authorities were contacted:

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

The following sections describe the relevant key permitting/approval processes for the closed cooling system and water supply options. The results are summarized in Tables CC-3 through CC-12 (one for each water supply option) that list the applicable permits and approvals, determine the critical path review processes and, most importantly, highlight those processes that may be fatally flawed or infeasible.

4.1.1.1 Dry/Air Cooling — Passive Dry Dry/Air Cooling and Mechanical (Forced) Draft Dry/Air Cooling

Both passive draft dry/air cooling and mechanical (forced) draft dry/air cooling options will be situated on a sloped portion of unoccupied land north of the power block area and an adjacent area outside of the existing DCPP property boundary. Both areas are north of Diablo Creek. The passive draft dry/air cooling option will require six tall passive draft dry/air cooling towers. The mechanical (forced) draft dry/air cooling option will add two large rectangular (1590 feet by 760 feet each), mechanical draft dry/air towers.

There will be no visible plume from these towers. Water sources for the dry tower systems can include saltwater, freshwater, and reclaimed water. The water withdrawal intake system for the saltwater option will require some limited marine work to the existing once-through system intake system. Some freshwater can come from a new system of onsite wells. Additional fresh or reclaimed water can come from sources such as the San Luis Obispo Wastewater Treatment Plant and the Morro Bay/Cayucos Wastewater Treatment Plant. These sources will supply the site via new pipelines. Shortfall in supplies will be covered by new desalination facilities. This is described in more detail in Section 4.5.2. The specific permits associated with external sources of freshwater and reclaimed water are beyond the scope of this initial assessment, but may be the subject of subsequent evaluations. The selection of the most favorable source or combination of sources to supply the required makeup water will be performed in Phase 2.

U.S. Army Corps of Engineers

The 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. While the passive draft dry/air cooling system is expected to pose limited construction impacts to USACE jurisdictional waters, this cooling tower option may involve USACE permitting—at least for the saltwater source option. The freshwater and reclaimed water supply options will likely not involve work in jurisdictional waters, unless the associated pipelines cross such areas. The impact of those offsite impacts are not addressed in this evaluation.

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. So it is possible that the passive draft dry/air cooling and mechanical (forced) draft dry/air cooling saltwater towers options could use a Nationwide Permit process. If the marine work associated with these dry cooling tower options exceeds that threshold allowed by the Nationwide Permit or is otherwise deemed significant, the individual Section 404/10 permit process is mandated. In addition to this federal permit, there is a somewhat parallel state regulatory review process, which culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the SWRCB. This certificate is issued before the Section 404 permit is issued by the USACE. While individual Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have the 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, the 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 the CCC and SWRCB. Receipt of an individual Section 404 permit is contingent on previous receipt of permits from the CCC and SWRCB.

This difficult process is impeded further by the understaffed local USACE offices (two to three permit writers), so permit review durations have been getting longer. For the more complex and challenging situations, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any barriers or fatal flaws regarding the Section 404 permitting process for nearshore marine work associated with changes to the existing saltwater intake system. (Lambert 2012) The freshwater and reclaimed water supply options for the passive draft dry/air cooling and mechanical (forced) draft dry/air cooling systems are assumed to be available at the property boundary (in this study phase) and so do not pose any immediate or significant concerns at this stage of the assessment.

Since the Section 404 permit represents a major federal action, it has the potential to trigger the National Environmental Policy Act, 42 U.S.C. § 4321 et seq. (NEPA) review process. At the heart of the NEPA process is the potential need to prepare an environmental impact statement (EIS) for those major federal actions that significantly affect the quality of the human environment. Within these regulations there are allowances for certain "categorical exclusions" for activities that do not individually or cumulatively have a significant impact on the human environment and, therefore, do not require either an environmental assessment or EIS. The USACE has historically chosen not to engage the NEPA process for cooling tower intake system activities. The USACE has often sought not to federalize this entire intake project activity and make it subject to the requirements of NEPA.

California Public Utilities 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 a regulatory statute that 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 technology.

The proposed addition of these significant tower systems will likely trigger preparation of an EIR. The EIR is a detailed report that identifies the potentially significant environmental effects the project is likely to have. The EIR identifies feasible alternatives to the proposed project and indicates the ways in which significant effects on the environment can be mitigated or avoided. This EIR will also be used by other state agencies to support their respective review and approval processes.

Following finalization of the EIR, the Lead Agency will evaluate whether to certify CEQA compliance. This certification then supports their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

While the CEQA review process and decision regarding cost recovery will likely be a lengthy, complex, and challenging process, there are no definitive environmental barriers that preclude successful completion of the CEQA review and a positive record of decision. This statement does not imply that these closed-cycle cooling systems are free of potentially complex and costly construction and operational demands.

California Coastal Commission

The CCC has a broad mandate to protect the coastal resources of California, which include the DCPP facility and any related site where the passive draft dry/air cooling and mechanical (forced) draft dry/air cooling towers could be sited. Consequently, the CCC's environmental concerns address a broad range of subject matter including visual resources, land and marine-based biological resources, land use, and socioeconomic concerns (for example, recreational use/access). Using a comprehensive approach, the CCC applies the policies of the California Coastal Act on a case-by-case and site-specific basis. The approach precludes screening either dry system cooling option from further consideration due to their being "unpermittable."

The CCC representatives (Detmer & Luster, 2012) indicated that the Commission recognized that there may be limited options to the once-through cooling system at DCPP. The CCC believes that almost all of the cooling system technology replacement options present some sort of negative impacts. However, the CCC appears to be resigned to consider options that may present additional onshore impacts to help mitigate the offshore environmental consequences of the existing once-through cooling system. 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 cooling system options from consideration, including passive draft dry/air cooling and mechanical (forced) draft dry/air cooling towers.

The only serious issue may be related to the fact that both the tall passive draft dry/air cooling structures and lower profile mechanical (forced) draft dry/air cooling structures will be situated on elevated terrain and so potentially visually intrusive. The CCC freely admitted that they would be very concerned with visual impacts from large cooling tower structures and towering plume columns. While this technology will not produce a visible plume, the passive draft dry/air cooling towers' tall profile and both tower options elevated location could be a significant barrier to securing the Commission's coastal development permit.

The passive draft dry/air cooling and mechanical (forced) draft dry/air cooling towers would not involve significant 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 challenging part of their review process.

The CCC would obviously view the reduction of thermal impact from the cooling system discharge (much reduced cooling tower blowdown discharge volume) and reduced entrainment/impingement impacts (reduced water withdrawal rates) as wholly positive outcomes from the application of both dry cooling systems. The overall weight of these positives in their balancing of environmental impacts is somewhat reduced by the fact that the Commission is not primarily charged with evaluating the cooling system's compliance with the *California Once-Through Cooling Policy* criteria or NPDES thermal discharge considerations.

The CCC review and approval process will be parallel with and influenced by the CEQA review process. That is, any application for a coastal development permit will depend on information that is generated by an associated EIR development process. Consequently, the CCC permit review process will also be coincident with CEQA and consequently its duration will mirror the CEQA timeline (6 months–1 year). That period offers evidence that the coastal development permit could be a critical path permitting process for the passive draft dry/air cooling technology (all water supply options).

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. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.
- **Mitigated Negative Declaration** — applicable for work that poses minor environmental impacts, during noncritical seasons, for limited period of time.
- **EIR/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.

The passive draft dry/air cooling and technologies could potentially require revisions of the current cooling system infrastructure in subaqueous lands. Commission representatives (DeLeon & Oggins, 2012) explained that recent experience regarding the progress of the lease approval process for nonnuclear facilities with existing once-through systems has been slow. Most of these 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 passive draft dry/air cooling and mechanical (forced) draft dry/air cooling options expected limited marine work may allow one to follow the more expeditious *Mitigated Negative Declaration* path, avoiding the longer, more complex EIR/CEQA review path. Consequently, the State Lands Commission lease will probably not represent a significant permitting hurdle for the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling technology (for any water supply option).

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

While the SWRCB has overall water-related permit authority for California's two active nuclear power stations, the CCRWQCB has the follow-on inspection and enforcement role for issuing permits. For DCPP, the SWRCB expects to modify the existing NPDES permit, potentially issue a new waste discharge requirements permit for construction impacts to jurisdictional streambed areas, and finally, grant the construction project coverage under the general storm water permit for construction activity to address related storm water management issues.

The passive draft dry/air cooling or mechanical (forced) draft dry/air cooling system will require the current DCPP NPDES permit to be revised to address the expected changes to the cooling system discharge quantity and quality and compliance with the provisions of *California Once-Through Cooling Policy* requirements (reduction of impingement and entrainment impacts to marine resources). For a saltwater supply, this revision will reflect the expected increase in water treatment additives to the circulating water system, the significantly reduced saltwater withdrawal rates), and altered storm water management features. The *California Once-Through Cooling Policy* requirements are not applicable, if the towers are supplied from freshwater and reclaimed water sources.

The waste discharge requirements permit may be required if the development of the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling towers impacts jurisdictional streambeds (waters of the state). The waste discharge requirements will be coordinated with the California Department of Fish & Game Streambed Alteration Agreement that addresses biological resource and habitat protection issues in these same streambeds.

Both the SWRCB and CCRWQCB representatives (Von Langen, 2012 and Jauregui, 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 saltwater passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system. 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 the *California Once-Through Cooling Policy* (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cycle cooling system). The saltwater passive draft dry/air cooling towers can obviously demonstrate compliance with the *California Once-Through Cooling Policy* requirements. The fresh or reclaimed water-supplied tower system completely avoids related compliance issues.

The CCRWQCB is ultimately a political body, whose members are interested in reviewing as much information/evidence as possible from the applicant and from 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 passive draft dry/air cooling or mechanical (forced) draft dry/air cooling technology (for any water supply option).

San Luis Obispo Air Pollution Control District (APCD)

DCPP is located within the San Luis Obispo APCD, 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 (wet closed-cycle systems), air quality permits/approvals are not expected to play an appreciable role for the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling system—dry cooling systems that are not expected to generate any additional operational air emissions.

San Luis Obispo County

The passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system 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.

The county recently completed a CEQA/conditional use permit review process for the DCPP steam generator replacement project (Hostetter, 2012). The county and the NRC were designated the lead agencies for the CEQA review. The CEQA/conditional use permit process for the steam generator replacement project, which involved significant rounds of negotiations, was characterized as complex and lengthy (years long).

As 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, the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling towers' significant land and marine impacts will be subject to this rigorous process. The county can be expected to aggressively pursue the evaluation of alternative cooling system options in addition to reviewing this cooling tower option.

The county also explained (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 the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling system. The county views the CEQA review process as the mechanism that will ultimately identify the best solution for DCPP—all solutions will be considered.

Other 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 passive draft dry/air cooling or mechanical (forced) draft dry/air cooling option. The U.S. Fish and Wildlife Service, the California Department of Fish & Game, and the California Office of Historic Preservation, for example, may play a significant regulatory role in this power plant upgrade effort. Both dry cooling tower system options will be located in unoccupied upland area and an adjacent property outside of the DCPP property boundaries. Both areas could contain some grassland

and chaparral habitat. These options will also demand pipeline crossing of a riparian habitat along Diablo Creek, which is upstream of a known cultural resource area. Finally, the California Energy Commission (CEC), who has review responsibilities for new thermal facilities greater than 50 MW or for power increase of 50 MW or more, will be largely excluded from the permitting processes primarily because the passive air-cooled draft cooling tower system will not boost the current power levels of the DCPP facility, let alone reach the 50 MW threshold increase in power that could mandate CEC review.

The tall passive draft dry/air cooling towers will significantly alter the overall profile of the DCPP facility because these tall towers are situated on elevated ground. The lower profile mechanical (forced) draft dry/air cooling towers will have a reduced, but still significant visual impact because of their location on this high ground. The passive draft dry/air cooling towers and any related construction equipment will extend beyond the 200-foot threshold typically used to define obstructions to aviation. Consequently, these tall structures and related construction equipment will warrant the submittal of Notices of Proposed Construction or Alteration with the FAA. The mechanical (forced) draft dry/air cooling towers and any related construction equipment are below this 200 foot threshold. Consequently, these towers will not warrant the submittal of related Notices of Proposed Construction or Alteration with the FAA.

Summary

The external approval and permitting assessment for the passive draft dry/air cooling and mechanical (forced) draft dry/air cooling systems identified a list of potentially applicable federal, state, and local permits and approvals. These permits lists are shown in Tables CC-3 through CC-6. The air-cooled process effectively mitigates all of the serious air quality concerns of the equivalent wet saltwater tower systems, while maintaining an intake system that is fully aligned with the requirements of the *California Once-Through Cooling Policy*. The main permitting challenges in this case are associated with the significant visual impacts of these cooling systems and their potential impacts to upland and riparian habitats. Both issues will be key aspects of the CEQA review process. This process and the associated permitting processes (CCC) may be challenging and lengthy. However, these regulatory hurdles do not represent fatal flaws that would preclude the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling option from further consideration.

The assessment also indicated that the Section 404 permit and the CEQA review process will likely represent the critical path review and approval processes (approximately 12 month) for the passive air-cooled towers. This critical path process does not represent a barrier to development of this cooling technology system.

4.1.1.2 Wet Cooling — Wet Natural Draft Cooling, Wet Mechanical (Forced) Draft Cooling and Hybrid Wet/Dry Cooling

The wet natural draft cooling tower option will involve the installation of multiple tall hyperbolic structures (approximately 600 feet above ground level) on a sloped unoccupied land north of the power block area, north of Diablo Creek. The wet mechanical (forced) draft cooling and hybrid wet/dry cooling tower options will also place four towers (lower profile mechanical draft towers or round wet/dry towers) in this same area and also evaluate permitting feasibility.

The wet natural draft cooling and wet mechanical (forced) draft cooling towers plume will be unabated and will produce significant visible plumes, while the hybrid wet/dry cooling system includes a plume abatement system that should largely limit the incidence of visible plumes. Water sources to the dry tower systems can include saltwater (would need to be desalinated due to PM-10 impacts), freshwater, and reclaimed water. The water withdrawal intake system for the saltwater option will require some limited marine work to the existing once-through system intake system. Some freshwater can come from a new system of onsite wells. Additional fresh or reclaimed water can come from sources such as the San Luis Obispo Wastewater Treatment Plant and the Morro Bay/Cayucos Wastewater Treatment Plant. These sources will supply the site via new pipelines. Shortfall in supplies will be covered by new desalination facilities. This is described in more detail in Section 4.5.1. The specific permits associated with external sources of freshwater and reclaimed water are beyond the scope of this initial assessment, but may be the subject of subsequent evaluations. The selection of the most favorable source or combination of sources to supply the required makeup water will be performed in Phase 2.

U.S. Army Corps of Engineers

The 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. While these cooling tower systems are expected to pose limited construction impacts to USACE jurisdictional waters, this cooling tower option may involve USACE permitting—at least for the saltwater source option. The freshwater and reclaimed water supply options will likely not involve work in jurisdictional waters, unless the associated pipelines cross such areas. The impact of those offsite impacts are not addressed in this evaluation.

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. So it is possible that these wet cooling tower saltwater options could demand a Nationwide Permit. If the marine work associated with this cooling tower option exceeds that threshold allowed by the Nationwide Permit or is otherwise deemed significant, DCPP would then be faced with securing a new individual Section 404/10 permit. In addition to this federal permit, there is a somewhat parallel state regulatory review process, which culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the California SWRCB. The certificate is issued before the Section 404 permit is issued by the USACE. While individual Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have the 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, the U.S. Fish and Wildlife Service, or the 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 the 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 understaffed local USACE offices (two to three permit writers), so permit review durations have been getting longer. For the more complex and challenging situations, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any barriers or fatal flaws regarding the Section 404 permitting process for nearshore marine work associated with changes to the existing saltwater intake system (Lambert, 2012). The freshwater and reclaimed water supply options for the wet tower systems offsite are assumed to be available at the property boundary (in this phase of the study) and so do not pose any immediate or significant concerns.

Because the Section 404 permit represents a major federal action, it has the potential to trigger the National Environmental Policy Act, 42 U.S.C. § 4321 et seq. review process. At the heart of the NEPA process is the potential need to prepare an EIS for those major federal actions that significantly affect the quality of the human environment. Within these regulations there are allowances for certain "categorical exclusions" for activities that do not individually or cumulatively have a significant impact on the human environment and therefore do not require either an environmental assessment or EIS. The USACE has historically chosen not to engage the NEPA process for cooling tower intake system activities. The USACE has often sought not to federalize this entire intake project activity and make it subject to the requirements of NEPA.

California Public Utilities Commission

PG&E's 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 technology.

The proposed addition of these significant tower systems will likely trigger preparation of an EIR. The EIR is a detailed report that identifies the potentially significant environmental effects the project is likely to have; identifies feasible alternatives to the proposed project; and indicates the ways in which significant effects on the environment can be mitigated or avoided. This EIR will also be used by other state agencies to support their respective review and approval processes.

Following finalization of the EIR, the CPUC will evaluate whether to certify CEQA compliance. This certification then supports their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

While the CEQA review process and decision regarding cost recovery will likely be a lengthy, complex and challenging process, there are no definitive environmental barriers that preclude successfully completion of the CEQA review. This does not imply that these closed-cycle cooling options are free of potentially complex and costly construction and operational demands.

California Coastal Commission

The CCC has a broad mandate to protect the coastal resources of California that include the DCPP facility and any related site where the wet natural draft cooling towers could be sited. Consequently, the CCC's environmental concerns address a broad range of subject matter including visual resources, land and marine-based biological resources, land use and socioeconomic concerns (for example, recreational use/access). Using a comprehensive approach, the CCC applies the policies of the California Coastal Act on a case-by-case and site-specific basis. The approach precludes screening wet cooling tower options from further consideration.

The CCC representatives (Detmer & Luster 2012) indicated that the Commission recognized that there were may be limited options to the existing once-through cooling system at DCPP. The CCC believes that almost all of the cooling system technology replacement options present some sort of negative impacts. However, the CCC appears to be resigned to consider options that may present additional onshore impacts to help mitigate the offshore environmental consequences of the existing once-through cooling system. 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 cooling system options from consideration, including wet cooling tower systems.

The only serious issue may be related to the rather tall wet natural draft cooling and somewhat lower wet mechanical (forced) draft cooling, which both generate a visually intrusive unabated cooling tower plume. The CCC freely admitted that they would be very concerned with visual impacts from large cooling tower structures and towering plume columns. Therefore, this visual resource issue has the potential to be barrier to the secure the Commission's coastal development permit for the wet natural draft cooling and wet mechanical (forced) draft cooling systems. The lower profile plume-abated hybrid wet/dry cooling towers would likely mitigate CCC visual resource concerns.

The wet towers would not involve significant 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 challenging part of their review process.

The CCC would obviously view the reduction of thermal impact from the cooling system discharge (significantly reduced cooling tower blowdown discharge volume) and reduced entrainment/impingement impacts (reduced water withdrawal rates) as wholly positive outcomes from the application of a wet tower system. 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 the *California Once-Through Cooling Policy* criteria or NPDES thermal discharge considerations.

The CCC review and approval process will be parallel and influenced by the CEQA review process. That is, any application for a coastal development permit will be dependent on information that is generated by associated EIR development process. Consequently, the CCC permit review process will also be coincident with CEQA and consequently its duration will mirror the CEQA timeline (6 months–1 year). That period offers evidence that the coastal development permit could be a critical path permitting process for the wet tower system (all water supply options).

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. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.

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

- **EIR/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.

The wet tower technologies could potentially require revisions of the current cooling system infrastructure in subaqueous lands. Commission representatives (DeLeon & Oggins, 2012) explained that recent experience regarding the progress of the lease approval process for nonnuclear facilities with existing once-through systems has been slow. Most of these 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 wet tower cooling systems' expected limited marine work may allow one to follow the more expeditious Mitigated Negative Declaration path, avoiding the longer, more complex EIR/CEQA review path. Consequently, the State Lands Commission lease will probably not represent a significant permitting hurdle for these wet cooling tower systems (any water supply option).

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

While the SWRCB has overall water permit authority for California's two active nuclear power stations, the Regional Water Quality Control Board has the follow-on inspection and enforcement role for the issue permits. For DCPP, the SWRCB expects to modify the existing NPDES permit, potentially issue a new waste discharge requirements permit for construction impacts to jurisdictional streambed areas, and finally, grant the construction project coverage under the general storm water permit for construction activity to address related storm water management issues.

The wet cooling tower systems will require the current DCPP NPDES permit to be revised to address the expected changes to the cooling system discharge (blowdown) quantity and quality and compliance with the provisions of *California Once-Through Cooling Policy* requirements (reduction of impingement and entrainment impacts to marine resources). For a saltwater supply, this revision will reflect the expected increase in water treatment additives to the circulating water system, the significantly reduced saltwater withdrawal rates, and altered storm water management features. The *California Once-Through Cooling Policy* requirements are not applicable if the towers are supplied from freshwater and reclaimed water sources.

The waste discharge requirement permit may be required if the development of the wet cooling system impacts jurisdictional streambeds (waters of the state). The waste discharge requirement will be coordinated with the California Department of Fish & Game Streambed Alteration Agreement, which addresses biological resource and habitat protection issues in these same streambeds.

Both the SWRCB and CCRWQCB representatives (Von Langen, 2012 and Jauregui, 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 saltwater wet tower systems. 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 *California Once-Through Cooling Policy* requirements (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cycle cooling system). The saltwater wet towers cooling tower system can obviously demonstrate compliance with the *California Once-Through Cooling Policy*. The fresh or reclaimed water-supplied tower system completely avoids these related compliance issues.

The Regional Water Quality Control Board is ultimately a political body, whose members are interested in reviewing as much information/evidence as possible from the applicant and from 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 wet cooling tower systems (for any water supply option).

San Luis Obispo Air Pollution Control District (APCD)

DCPP is located within the San Luis Obispo APCD, 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. Given this regional status, the particulate emissions from the operation of a wet saltwater system can be expected to present a significant regulatory challenge, especially for the saltwater supply option.

From previous studies (TetraTech, 2008) it is clear that a saltwater wet natural draft cooling tower system will generate particulate emissions in quantities that will exceed the major source threshold for PM-10 (100 tons/year). If the DCPP facility was already a major source of a criteria air pollutant (that is, maintaining a major source air permit), this threshold drops to the major modification level of 15 tons/year.

Given this status, the addition of a saltwater wet natural draft cooling system is expected to increase PM-10 emissions by more than 100 tons per year, which will make the DCPP subject to a formal New Source Review process. This process will eventually culminate in forcing DCPP to secure PM-10 emissions offsets in response to the new cooling tower-related particulate emission. The fresh and reclaimed water-supplied wet cooling towers will likely not trigger this 100-ton threshold.

The San Luis Obispo APCD representative (Willey, 2012) explained that they maintain a registry of emission reduction credits for PM-10. There is no PM-2.5 registry. The total PM-10 tons/year emission reduction credits (that is, emission offsets) available in this District totals approximately 31 tons/year—see Table CC-2 for an excerpt of this summary. These emissions are retained or owned by a number of different companies or organizations. The emission reduction credits are available for sale or they can be retained by the Owners for future use. Alternatively, the interested party can generate additional emission reduction credits by shutting down additional sources of PM-10 either within their direct control or via separate third-party arrangements.

The saltwater water cooling towers are expected to generate PM-10 emissions far in excess of 31 tons/year. It is likely that the fresh or reclaimed water options for closed cooling systems could also generate substantial PM-10-related emissions. To offset these PM-10 emissions from the wet tower systems, PG&E would need to purchase these available emission reduction credits and potentially supplement this with other emission reduction credits. PG&E could generate these emission reduction credits directly through PM-10 emission reductions within their own fleet of regulated sources or they could encourage others to make similar reductions.

In addition to the issue of available emission offsets, there is the issue of 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. The air quality and visibility impact of the saltwater wet towers particulate emission will have to be assessed on the closest Class I areas to DCPP (San Rafael Wilderness and Ventana Wilderness). See Figure CC-15 for the location of these areas.

In summary, there are only a finite number of PM-10-related emission credits available from a disparate set of Owners, who are not necessarily ready or willing to sell these credits. The process to generate additional PM-10 emission reduction credits is not expected to close this gap between available offsets and the annual facility PM-10 emissions. Thus, the particulate emissions from the saltwater towers combined with the insufficient particulate emission offsets means that DCPP will most likely not be able to secure the necessary major source air permit to support wet saltwater tower operation. The air quality and visibility impacts to nearby Class I areas from the cooling tower particulate emissions are also a potentially significant issue, but they are a second order consideration relative to the emission offset situation. The lack of sufficient PM-10 emission offsets is a clear fatal flaw condition for saltwater wet towers that will preclude this cooling system from further consideration. There is no such fatal flaw for the fresh and reclaimed water-supplied wet towers.

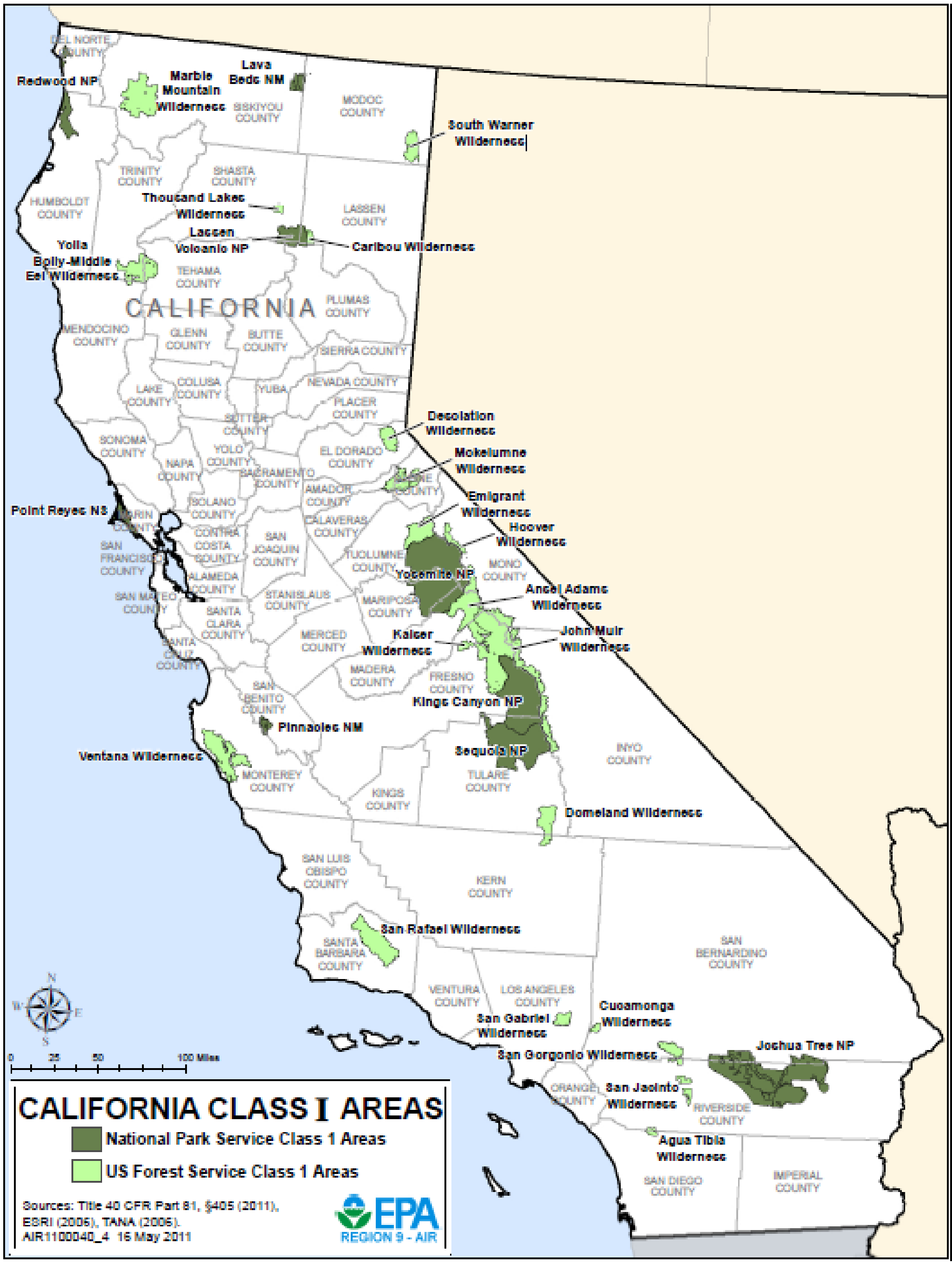


Figure CC-15. *Southern California Class I Areas*

Re: http://www.epa.gov/region9/air/maps/pdfs/AIR1100040_4.pdf

San Luis Obispo County

The wet cooling tower systems 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.

The county recently completed a CEQA/conditional use permit review process for the DCPP steam generator replacement project (Hostetter, 2012). The county and the NRC were designated the lead agencies for the CEQA review. The CEQA/conditional use permit process for the steam generator replacement project, which involved significant rounds of negotiations, was characterized as complex and lengthy (years long).

As 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, the wet towers significant land, air, and marine impacts will be subject to this rigorous process. The county can be expected to aggressively pursue the evaluation of alternative cooling system options in addition to reviewing this cooling tower option.

The county also explained (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 the wet cooling systems. The county views the CEQA review process as the mechanism that will ultimately identify the best solution for DCPP—all solutions will be considered.

Other 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 wet cooling tower options. The U.S. Fish and Wildlife Service, the California Department of Fish & Game, and the California Office of Historic Preservation, for example, may play a significant regulatory role in this power plant upgrade effort. The wet tower systems will be located in unoccupied upland area, which could contain some marginal grassland and chaparral habitat. This option will also demand pipeline crossing of a riparian habitat along Diablo Creek, which is upstream of a known cultural resource area. Finally, the CEC, who has review responsibility for new thermal facilities greater than 50 MW and for power increases of 50 MW or more, will be largely excluded from the permitting processes primarily because the wet cooling tower systems will not boost the current power levels of the DCPP facility, let alone reach the necessary 50 MW threshold increase in power that could mandate CEC review.

The wet natural draft cooling towers will significantly alter the overall profile of the DCPP facility and they are likely to require cranes over 200 feet above local ground level. Because the towers and related cranes have the potential to be obstructions to aviation, related Notices of Proposed Construction or Alteration will need to be filed with the FAA to facilitate their review. The wet mechanical (forced) draft cooling and hybrid wet/dry cooling towers will also alter the overall profile of the previously undeveloped area, but theses tower systems and the related construction equipment are below the 200 foot FAA threshold. Consequently, these systems will not warrant the submittal of related Notices of Proposed Construction or Alteration with the FAA.

Summary

The external approval and permitting assessment for the wet tower systems identified a list of potentially applicable federal, state, and local permits and approvals that not surprisingly focused on its significant impacts to local air quality and the coastal zone. These permits lists are shown in Tables CC-7 through CC-12. While the efforts to conduct a successful CEQA review and secure the requisite USACE Section 404 permit, CCC coastal development permit, State Lands Commission Lease, NPDES permit modification will represent challenges, the air quality permitting process is constrained by clear fatal flaw for the saltwater supply option.

As noted earlier, San Luis Obispo APCD is a non-attainment area for PM-10 and the finite number of PM-10-related emission credits available fall well short of the amount necessary to offset the wet cooling tower generated salt emissions. The gap is too large to encourage any attempts to generate additional particulate offsets from reducing the particulate emissions from local industrial sources of particulates. Without these offsets, DCPP would most likely not be able to secure the necessary major source air permit to support saltwater wet tower operation. The saltwater-supplied wet cooling tower technologies (wet natural draft cooling, wet mechanical [forced] draft cooling) cannot be considered a viable option. The fresh and reclaimed water supply cooling tower options do not have this definitive fatal flaw, but they still have the permitting challenges posed by new construction and very prominent structures in the coastal zone.

4.1.2 Once-Through Cooling Intake Systems

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of once-through cooling intake systems.

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 once-through cooling intake options was evaluated. Those permits and approvals that 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 the once-through cooling intake systems from further consideration. The assessment also focused on identifying the critical path (longest duration) initial preconstruction permitting processes, that is, those that support site mobilization, physical site access, initial earthwork/foundations for each cooling system technology 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 that support later stages of construction and operation that are not critical path to the commencement of construction were also included in the assessment since these items could pose significant operational constraints to future DCPP operations.

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

The following regulatory authorities were contacted:

- U.S. Army Corps of Engineers
- California Public Utilities Commission
- California Coastal Commission
- California State Lands Commission
- State Water Resources Control Board
- Central Coast Regional Water Quality Control Board
- San Luis Obispo Air Pollution Control District
- San Luis Obispo County

The following sections describe the relevant key permitting/approval processes for the once-through cooling intake technologies and summarize these findings in Tables DW-1, IR-1, IMFS-1, WW-1, OS-1, SWS-1 and VS-1. These tables list the applicable permits and approvals, determine the critical path review processes and most importantly, highlight those processes that may be fatally flawed or infeasible.

U.S. Army Corps of Engineers

The 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 once-through cooling intake systems will involve both land-based, nearshore, and offshore construction activities. The latter two sets are drivers for these permits. The deepwater intake, wedge wire, offshore relocated intake, and substrate filtering systems will involve offshore cut and fill and/or tunneling (tunnel boring machine) processes, which will pose significant construction impacts to USACE jurisdictional waters. The inshore fine screen system will require nearshore construction activities and so also pose impacts to jurisdictional waters. The operational strategies and variable speed cooling pump systems are not expected to pose any appreciable impacts to 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 significant marine work associated with the deepwater offshore intake, offshore intake relocation, inshore mechanical fine screen mesh, and substrate filtering intake options preclude any Nationwide Permit permitting process for the associated marine-based construction. DCPP, therefore, would then be faced with securing the more complex individual Section 404/10 permits for these options. In addition, to this federal permit there is a somewhat parallel state regulatory review process, which culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the California State Water Resources Control Board. The certificate is issued before the Section 404 permit is issued by the USACE. The variable speed cooling pumps and operational strategies intake options will not demand either form of the Section 404 permit or the Section 401 Certificate.

While Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have a 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 the 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 in permitting process is impeded further by the understaffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and challenging situations such as for this technology, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process. Given the significant new marine work associated with this cooling technology option, it is likely that the Section 404 will represent a critical path item to the completion of permitting for the impacted once-through cooling intake options.

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 the applicable once-through cooling intake systems—deepwater offshore intake, initial intake relocation (inshore), inshore mechanical fine mesh, offshore wedge wire and substrate intake systems. (Lambert, 2012)

Since the Section 404 permit represents a major federal action it has the potential to trigger the National Environmental Policy Act, 42 U.S.C. § 4321 et seq. ("NEPA") review process. At the heart of the NEPA process is the potential need to prepare an EIS for those major federal actions that significantly affect the quality of the human environment. Within these regulations there are allowances for certain "categorical exclusions" for activities that do not individually or cumulatively have a significant impact on the human environment and therefore do not require either an environmental assessment or EIS. The USACE has historically chosen not to engage the NEPA process for cooling tower intake system activities. The USACE has often sought not to federalize this entire intake project activity and make it subject to the requirements of NEPA.

California Public Utilities 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 a 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 technology.

The operational strategies and variable speed cooling pump systems may not trigger the CEQA process, but it will still demand the preparation of a Proponents Environmental Assessment. Should the CEQA process be triggered, it will likely follow the more abbreviated process that involves the preparation of an *Initial Study*, followed by either a *Negative Declaration*, which is indicative of no adverse impacts, or *a Mitigated Negative Declaration* that follows mitigation of relatively minor impacts from the proposed action—in this case, the addition of a new cooling system technology.

Therefore, for the variable speed cooling water pump and operational strategies, the cooling tower systems will be mostly a perfunctory affair and consequently will not represent a barrier to development. The proposed deepwater offshore intake, initial intake relocation (offshore), inshore mechanical fine mesh screens, offshore wedge wire and substrate intake systems will probably trigger preparation of EIR. The EIR is a detailed report that identifies the potentially significant environmental effects the project is likely to have. The EIR identifies feasible alternatives to the proposed project and indicates the ways in which significant effects on the environment can be mitigated or avoided. This EIR will also be used by other state agencies to support their respective review and approval processes.

Following finalization of the EIR, the Lead Agency will evaluate whether to certify CEQA compliance. This certification then supports their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

While the CEQA review process and decision regarding cost recovery will likely be a lengthy, complex, and challenging process, there are no definitive environmental barriers that preclude successfully completion of the CEQA review and a positive record of decision from the Lead Agency or other designated lead agency. This statement does not imply that some of these systems are free of potentially significant and costly construction and operational demands.

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 including visual resources, land and marine-based biological resources, land use, and socioeconomic concerns (for example, recreational use/access). Using a comprehensive approach, the Commission applies the policies of the California Coastal Act on a case-by-case and site-specific basis. That approach precludes screening any of the cooling system technology options from further consideration due to their being "unpermittable."

The CCC representatives (Detmer, 2012 and Luster, 2012) indicated that the Commission recognizes that there may be limited options to the existing once-through cooling system at DCPP. Indeed, they indicated that almost all of the cooling system technology replacement options present some sort of negative impacts. However, the CCC appears to be resigned to consider options, which may present additional onshore or different offshore 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 cooling system options from consideration, including the deepwater intake system.

Despite the lack of obvious fatal flaws, the deepwater offshore intake, initial intake relocation (offshore), inshore mechanical find mesh screen, offshore wedge wire, and substrate filtering systems will certainly include significant marine-based construction efforts, so the CCC will be focused on the deleterious construction impacts on marine resources (for example, local fish, shellfish, vegetation, hard marine substrate, commercial fishing) and the potentially offsetting positive benefits associated with reducing operational entrainment impacts. These impacts may be reduced for those technologies that move the intake to deeper more distant locations—assuming these areas prove to offer a less rich biological and so less entrainment losses despite the largely unchanged water withdrawal rate. Visual impacts in the coastal zone, a typical key CCC subject area, may be a factor for this largely submerged system, because some of the options will add new low profile features to the onshore or nearshore areas. Thermal discharge impact matters will also be sideline issues, since they remain largely unchanged with once-through cooling intake systems.

The variable speed cooling water pump and operational strategies options will not pose any visual impacts. These technologies will also pose limited to no marine construction efforts, so the CCC will not identify any issues regarding negative impacts to marine resources (for example, marine substrate or commercial fishing). The CCC consideration of these issues and their follow-on approval process will be parallel to and influenced by the CEQA review process. That is, any application for a coastal development permit will depend on information generated by associated EIR development process. Consequently, the CCC permit review process will also be coincident with CEQA and consequently, its duration will mirror the CEQA timeline (approximately 1 year). That period offers evidence that the coastal development permit could be a critical path permitting process.

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. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.

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

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

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. As the deepwater offshore intake, initial intake relocation (offshore), inshore mechanical fine mesh screen, offshore wedge wire, and substrate intake systems will obviously result in a significant addition of cooling system infrastructure to subaqueous lands, DCPP will not be able to pursue the largely administrative *Categorical Exemption* path or the streamlined *mitigated negative declaration* process. This option will invoke the longer, more complex EIR/CEQA review process.

The operational strategies and variable speed cooling water pump system technologies are not expected to require revision of the cooling system infrastructure situated on subaqueous lands and so will likely follow the categorical exemption process mode, if evaluated at all by the Commission. Commission representatives (DeLeon, 2012 and Oggins, 2012) explained the current process for nonnuclear coastal power plant lease holders to develop and implement their "implementation plan" to meet *California's Once-Through-Cooling Policy* performance goals has been very slow. Most of these facilities have requested extensions to continue to evaluate the potentially available mitigation strategies. This experience offers evidence that the associated CEQA review will not be an expeditious process. A review period of at least 1 year is a distinct possibility.

Despite this expected lengthy review process, the associated marine work in subaqueous lands for deepwater offshore intake, initial intake relocation (offshore), inshore mechanical fine mesh screen, offshore wedge wire, and substrate intake systems does not appear to offer any specific impacts or regulatory considerations that represent fatal flaws.

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

While the SWRCB has overall water-related permit authority for California's two active the 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 deepwater intake system. The once-through cooling intake options will all pose some disruption to local land surfaces. These construction impacts will likely be addressed and managed (to the extent necessary) via the site's existing storm water best management practices and management plans, in lieu of seeking coverage under a general storm water permit for construction activities. New impacts to jurisdictional streambeds and related water discharge permits are not expected.

The deepwater intake construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the new velocity cap system using the tunnel boring machine will reduce marine habitat losses and water quality impact areas close to the new velocity cap.

Operationally, the deepwater offshore intake system will not appreciably reduce the impingement impacts, because the current system has proven to already reduce impingement losses. This system will not, by itself, reduce the overall water withdrawal or discharge rates. While entrainment-related impacts may be reduced primarily because water withdrawal will occur in a deeper and ostensibly less biologically active region, studies (see Section 4.2) do not support this common assumption. Thermal discharge impacts to aquatic life will remain largely unchanged.

The relocated offshore intake system construction activities will potentially generate significant, temporary water quality and marine habitat (intertidal and sub tidal) impacts. Installation of the system using the tunnel boring machine will limit the marine habitat losses and water quality impacts to localized areas near the new velocity cap.

Operationally, the relocated offshore intake system may reduce the impingement impacts relative to the existing inshore system, but this reduction is tempered by the fact that the existing inshore system has proven to already mitigate these impacts. The offshore deeper less biologically productive location again could be expected to mitigate some of the entrainment impacts, though local studies have indicated this is not the case. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Consequently, the thermal discharge impacts to aquatic life will remain largely unchanged.

Modular wedge wire screen system construction activities will potentially generate significant, temporary water quality and marine habitat (intertidal and sub tidal) impacts. Installation of the wedge wire modular screens and connecting piping via the cut-and-fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a considerable area of biological productive marine habitat area. Installation of the system using the tunnel boring machine will reduce marine habitat losses and water quality impacts to localized areas around each screen modules.

Operationally, the low inlet velocity offshore wedge wire screen system will effectively reduce the impacts of fish impingement and entrainment of juvenile fish associated with once-through systems. This system will not, by itself, reduce the overall water withdrawal or discharge rates. While this screening system may afford some reduction of entrainment-related impacts, the thermal discharge impacts to aquatic life will remain largely unchanged.

The substrate filtering intake construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the pipeline laterals via the cut and fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a biologically productive marine habitat area. Installation of the system using the tunnel boring machine for the main manifold lines will reduce marine habitat losses and water quality impact areas.

Operationally, the substrate filtering intake system will appreciably reduce the impingement impacts. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Entrainment-related impacts will be also reduced primarily because water withdrawal is though the substrate. Thermal discharge impacts to aquatic life will remain largely unchanged.

The reduced water withdrawal rates associated with this option will occur in response to changes in ambient conditions and regional power demands. Reduced cooling water needs will be associated with a parallel improvement in impingement and entrapment. 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 flexible withdrawal rates.

The operational strategies will alter some aspects of intake operation, but will not change the peak water withdrawal rates, nor appreciably change the water treatment system. 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. The cooling water withdrawal and discharge rates will remain essentially unchanged for these once-through cooling options, so any revisions to the current DCPP NPDES permit will be limited to compliance provisions of the *California Once-Through Cooling Policy*. There will ostensibly be no changes to the current water treatment system, as these once-through cooling options are still once-through cooling systems. Both the SWRCB and CCRWQCB representatives (Jauregui, 2012 and Von Langen, 2012) explained that there are no obvious regulatory barriers regarding issuance of this revised NPDES permit for any of the cooling system options currently under consideration, including these once-through cooling technology options. 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 the *California Once-Through Cooling Policy* (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cooling cycle system). The once-through cooling intake systems entrainment reduction performances (with the possible exception of the substrate system) fall well short of closed-cycle cooling attributes.

The SWRCB is ultimately a political body whose members are interested in reviewing as much information/evidence from the applicant and from 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 any of the once-through cooling intake systems.

San Luis Obispo Air Pollution Control District

DCPP is located within the San Luis Obispo APCD—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 any of the once-through cooling systems—systems that are not expected to generate any additional operational air emissions.

San Luis Obispo County

Most of the potential cooling system 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. The operational strategies and variable speed cooling water pump system may not 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 NRC, were designated the "lead agencies" for the CEQA review. The CEQA/conditional use permit process for the steam generator replacement project, which involved significant rounds of negotiations, was characterized as complex and lengthy (years long).

As 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, the once-through cooling intake systems with significant marine impacts will be subject to this rigorous process. The county can be expected to aggressively pursue the evaluation of alternative cooling system options in addition to reviewing the deepwater intake system.

The county also explained (Hostetter, 2012) that it is unlikely that they will identify any environmental impact criteria from the CEQA review process, which would immediately preclude any of the cooling system intake alternatives under consideration. The county views the CEQA review process as the mechanism that 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 & Game, and California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. Construction and operation of the offshore systems (deepwater intake, wedge wire screen, relocated offshore intake, substrate filtering) is likely to temporarily and permanently disturbance sensitive marine habitat and also could reduce overall impacts to local fish and shellfish, although local studies do not support that consideration for the deepwater and offshore relocated intakes. These attributes will make the U.S. Fish and Wildlife Service and California Department of Fish & Game service key parties to CEQA review process, but they are not expected to trigger the need to secure a 2081 Incidental Take permit because of the lack of marine-based endangered species. Since these once-through cooling intake options primarily involves onshore and nearshore work in already developed areas and offshore work in submerged lands, it is unlikely the cultural or historic resources (land-based) will be impacted.

Installation of the associated onshore, nearshore, and off shore facilities will not appreciably alter the overall profile of the DCPP facility and certainly not require significantly tall or oversized construction equipment. These considerations will preclude significant interactions with California Department of Transportation (Caltrans) (roadway crossings, encroachments, oversized vehicles) and the 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 CEC, who has review responsibilities for new thermal facilities greater than 50 MW or for power increases of 50 MW or more, will be largely excluded from the permitting processes primarily because offshore deep offshore intake system will not boost currently power levels of the DCPP facility, let alone reach the necessary 50 MW increase threshold, that could mandate CEC review.

4.1.2.2 Summary

The external approval and permitting assessment for the once-through cooling intake systems identified a list of potentially applicable federal, state, and local permits for each system.

For the variable speed cooling speed cooling water pump and operational strategies systems, this list is rather short because of the limited nature of the construction work and largely unchanged operating characteristics associated with these systems. The only substantive permits or approvals that will potentially apply to these two intake technology options are the CEQA process and the amendment to the existing NPDES permits. Both the CEQA review and NPDES amendment processes are not expected to be challenging or lengthy. While this cooling system option may provide only limited improvements relative to the *Once-Through Cooling Policy* 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 that would preclude this option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws or feasibility constraints in the associated regulatory review process that would preclude the variable speed cooling water pumping system or operational strategies from further consideration.

The assessment also indicated that the CEQA review process, even in its expected abbreviated form, will likely represent the critical path approval (6–9 months) for the variable speed cooling water pump system and operational strategies. Obviously, the duration of this critical path process does not represent a barrier to developing either of these options.

For the other once-through cooling options, this list was longer because of their more significant impacts to the onshore, nearshore, and offshore marine environment. The efforts to conduct a successful CEQA review and secure the requisite USACE Section 404 permit, CCC Coastal development permit, State Lands Commission Lease, and NPDES permit modification will represent the primary regulatory challenges.

These permits are all expected to be challenging and have lengthy review processes that are aligned with the CEQA/EIR review process. The primary challenges for most of these systems are associated with the associated significant construction impacts to nearshore and in some cases also deepwater marine habitats, in comparison with some minimal (relocated inshore intake, deepwater intake) or incremental reductions (wedge wire, inshore fine screen) of marine resources impacts. The substrate filtering intake system operational performance, while certainly approaching that of closed cooling systems, again poses the most significant construction impacts to these marine habitats. Despite these incremental improvements offered by some of the systems and the potential for imbalances when compared with construction impacts, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or regulatory criteria that would preclude these technology options from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process that would preclude these once-through systems from further consideration.

The assessment also indicated that the Section 404 permit and the CPUC-sponsored CEQA review process will likely represent the critical path review and approval processes (approximately 12 month) for the deepwater offshore intake, initial intake relocation (offshore), inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems. This critical path process does not represent a barrier to development of these cooling technology intake systems.

4.2 Impingement/Entrainment Design

4.2.1 Closed-Cycle Cooling Systems

Use of any of the closed-cycle technologies evaluated in this report will be acceptable with respect to impingement/entrainment design in accordance with the *California Once-Through Cooling Policy*. The dry technologies will not require a continuous water makeup source after the closed system is initially charged because there will not be any evaporative or drift losses and makeup will only be required to account for any small system leaks or other losses. Due to the fatal flaw associated with permitting seawater use, as described in Section 4.1, the only water sources that can be used for the wet and hybrid wet/dry cooling technologies are fresh and reclaimed water. These sources are assumed to be available from wells and water treatment facilities and, thus, impingement/entrainment associated with intake structures from oceans or other open water sources would not be present. The only significant continuous makeup that will be required from the ocean for any of the closed-cycle options will be what is required to support any safety-related systems.

The facility water intake flow is assumed to be directly proportional to impingement and entrainment effects. Therefore, reductions in intake flow rate are considered equivalent to reductions in impingement and entrainment. At DCPP Units 1 and 2, the existing once-through cooling systems would be replaced with closed-cycle cooling towers for all but the safety-related systems and components, which would remain cooled by the auxiliary saltwater system using once-through cooling. The auxiliary saltwater system represents approximately 2 to 5 percent of total plant cooling water flow rate. Retrofitting the existing once-through cooling systems for Units 1 and 2 with closed-cycle cooling towers would therefore reduce cooling water withdrawals from the Pacific Ocean by approximately 95 to 98 percent. Impingement and entrainment is expected to be reduced by a similar proportion resulting in compliance with the proposed *California Once-Through Cooling Policy* requirements.

4.2.2 Deepwater Offshore Intake

The primary objective of implementing the deepwater intake technology is to locate the withdrawal inlet selectively in deeper waters where, in theory, biological abundance will be lower. This relocation offers the possibility of substantially reducing entrainment of aquatic species at different stages of life (including fish, fish eggs, and larvae) and reducing impingement mortality. A detailed evaluation regarding the potential of this technology to meet the impingements and entrainment requirements of the *California Once-Through Cooling Policy* is described below. This evaluation was supported by reviews of the available literatures and studies of fish and larvae abundance and distribution along the California Coast.

4.2.2.1 Fish and Larvae Distribution

The degree of benefit of an offshore intake in reducing entrainment depends to a large degree on the vertical stratification of entrainable organisms in the water column at the point of water withdrawal. In such a system, a reduction in entrainment is achieved by locating the offshore submerged intake at a location where the density of entrainable organisms is less than at other locations.

Larval fish surveys were conducted, before DCPP was operational, at two sampling locations offshore during 1974 and 1975 by Icanberry (Tenera, 2000). Comparison of larval fish densities collected in oblique near-bottom to surface plankton net hauls at the two sampling stations (located 300 meters [1,000 feet] and 1,500 meters [5,000 feet] offshore) showed no statistically significant differences in total larval fish densities between the two locations. Statistical differences were found between locations for two of the six most abundant fish taxa. Densities of larval sculpin were found to be greater at the 300-meter station and densities of larval northern lampfish were found to be greater at the 1,000-meter station. Results of these larval fish studies provide no evidence that larval fish densities are consistently lower offshore at locations where an offshore intake could be constructed (Tenera 2000).

After plants operation, densities of larval fish were collected during 1986 and 1987 and compared between sampling locations within the DCPP intake cove and at an offshore location close to Icanberry's 300-meter station (Tenera, 2000). Results of the comparison indicate that although the plankton densities at both locations are characterized by high variability, densities were generally higher in the intake cove than at the offshore location. A more detailed examination of the trends in species-specific densities between the two locations indicated that the higher densities observed in the intake cove were largely attributable to the presence of cottid (sculpin) larvae during 1986–1987. No significant differences in larval fish densities were detected between the two sampling locations when larval sculpin were excluded from the analysis (Tenera, 2000).

Density and seasonality of larval fish populations are also reported in the assessment of fishes collected in entrainment and study grid samples performed by Tenera during the period of 1996 through 1999. Larval fish populations demonstrated wide variability in density affected by episodic oceanographic events. Fish composition analysis indicated that a diverse assemblage of fish larvae inhabit the waters where a hypothetical offshore intake could be constructed. The cumulative density of fishes collected in paired entrainment and study-grid surveys was determined. The cumulative density of each species collected was quantified as a percentage of the entire density of fishes collected and summarized by family. The paired intake grid samples were collected for two year periods between July 1, 1997 and June 30, 1998 and from July 1, 1998 to June 30, 1999.

Fishes collected in both entrainment and study grid surveys represented diverse group of species that inhabit shallow and deeper habitats near DCPP. Many fishes that typically inhabit shallow nearshore areas comprised a larger portion of the species collected in entrainment samples. At the same time, a high diversity of larval fishes was collected in the study grid in areas where an offshore intake could be constructed. The differences in mean percent composition indicate that ronquil, blenny, herring and sardine, anchovy, lanternfish, rockfish, and many others would become susceptible to entrainment at a hypothetical offshore location compared to the kelpfish, sculpin, goby, prickleback, and others currently entrained from the DCPP shoreline intake location.

4.2.2.2 Fish Behavior at Intake Structures

Generally, the offshore intake structures attract two types of fish species with different types of behavior—reef-associated species (such as shiner perch and white sea perch) with directional movement, which use intake structures as artificial reefs and transient species (such as queenfish, white croaker, surfperch, northern anchovy, and Pacific pompano), which generally encounter intake at night (Helvey, 1985a). For transient species, the intake encounters are a result of random movements, while for many reef-associated fishes, these encounters are tied to directional movements toward the structures.

The entrapment of these species results from different behavioral activities that bring these species into direct contact with the intake water currents at times when their vision is impaired, or during the presence of storms and swirling flows, which disorient fish (Helvey, 1985a). Proper design of offshore intake structures, such as avoidance of placing riprap piles around the structure, plays a major role in minimizing the entrapment of various types of fish (Helvey, 1985b). The hydraulic design of the velocity cap, however, avoids formation of swirling flows, assisting fish to swim away from the structure (ASCE, 1982).

4.2.2.3 Entrainment

As described in Sections 4.2.2.1 and 4.2.2.2, the fish and fish larvae found over a wide range of water depths and distances offshore of DCPP and they can be attracted to the intake due to their behavioral characteristics. Review of fish and larval density and variability studies, referenced above, indicate that there is no clear evidence to support that withdrawal from a deep sea location will achieve the entrainment reduction required under the *California Once-Through Cooling Policy* requirements.

4.2.2.4 Impingement

The relocation of the withdrawal inlet from shoreline to a deeper offshore location does not in itself demonstrate compliance with the *California Once-Through Cooling Policy* rules. Compliance with the impingement reduction requirement will likely require the offshore velocity caps to be designed with a 0.5 fps or lower intake velocity. At the new shoreline screen house and pump structure, consideration may also need to have a 0.5 fps or lower through-screen velocity. Also, the addition of a fish-handling and return system will be required to reduce impingement mortality and avoid fish entrapment.

4.2.2.5 Summary and Impacts

As stated in this Section 4.2.2:

- The DCPP coastal area previous field studies do not identify a statistically significant correlation between fish densities and offshore distances and water depths.
- The deep sea offshore velocity caps will likely attract the reef species as well as other types of fish, which pass the structure on a random basis and become entrained in the system.
- Velocity cap will need to be sized for a 0.5 fps intake inlet velocity to comply with impingement mortality reduction rule, while the shoreline intake screening system may also need to consider sizing for a 0.5 fps through-screen velocity to further reduce impingement. Finally, a fish-handling and return system will be required to return fish trapped in the shoreline intake area back to the ocean.

As described above, substantial new constructions and modifications to existing structures are required to implement this deep sea intake technology. However, this system offers no clear benefit or advantage over other technologies, such as the wedge wire screen system, with respect to fish protection. As a result, there is not sufficient justification to recommend that this technology be a candidate for further evaluation in the next phase of the assessment.

4.2.3 Initial Intake Relocation

The current DCPP shoreline intake system allows fish to enter the onshore pump intake structure directly. There are six traveling water screens per unit with a flow-through velocity of 1.95 fps. Fish egg, larvae, and fish drawn into the intake would either pass through the screen mesh or impinged on screen panels. In lieu of the current open channel system using offshore velocity cap intakes in deeper, less biologically productive water, combined with low inlet velocity of 0.5 fps, serves to encourage less adult/juvenile fish to enter the intake system. For fish that do enter through the offshore intake system, the proposed fish collection and return system, equipped with each screen, would be able to return them back to the source water via the return piping.

The offshore velocity cap intake technology positions the velocity cap intakes in deeper, less biologically productive water, a significant distance from the existing shoreline intake system. Fish in the immediate area of the velocity cap will be able to sense the relatively gentle influent velocity (no more than 0.5 fps) and escape the area. As a result of using multiple velocity caps, the fish entrainment into the offshore intake system will be minimized, which subsequently will reduce the number of fish potentially getting impinged on the screens. In addition, all existing traveling water screens will be modified to add on the fish collection and return system to permit the return of impinged fish to the ocean via the return line. This arrangement satisfies the intent of the proposed Phase II rule, Section 122.21(r)(6) for impingement mortality reduction plan for the power plants using offshore velocity cap intakes (USEPA, 2011).

Finally, the deeper intake location and low inlet velocity results in a lower populations of fish eggs and larvae and reduced entrainment losses even though the water withdrawal rate remains unchanged.

In summary, use of a new offshore intake location, velocity cap intakes with low velocity, and the fish collection and return system with all traveling screens will result in significant improvement in both impingement mortality and entrainment losses.

4.2.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

The design of inshore fine mesh screen technology affects impingement and entrainment reduction primarily in three ways: (1) the fine mesh screens of 1 to 2 millimeters mesh to be fitted on the new dual flow screen system act as a physical barrier to prevent aquatic organisms larger than the mesh opening from being entrained; (2) fish collection buckets installed at bottom of each screen panel along with continuously rotating screens and the application of a low-pressure spray combine to collect the larval organisms and fish and then wash them off the screen and collection buckets; and (3) return the collected fish and larval organisms to the source water via the return piping with adequate water depth.

The use of fine mesh screens has been investigated in laboratory studies to determine their potential to minimize entrainment at power plant intakes. Information from laboratory tests shows that traveling screens equipped with 1.0-millimeter screen mesh could substantially reduce entrainment of fish eggs and larvae at DCPP and that entrainment of larval fish and macro-invertebrates could be virtually eliminated by using 0.5-millimeter intake screen mesh (Tenera, 2000). Impingement survival for fish larvae, however, is species-specific. Under laboratory conditions, the survival rates for larvae at 48 hours, after a 16-minute period of impingement on fine mesh screens, ranged from less than 1 percent for striped bass to 96 percent for bluegill and smallmouth bass. The smaller intake screen mesh would increase impingement of larval and juvenile fish and invertebrates presently entrained at DCPP. The finer mesh screen would convert normally entrained organisms into impinged organisms. (Tenera, 2000)

An angled fine screen intake was constructed in 1984 at the Brayton Point Generating Station Unit 4 to protect fish and larvae and to allow the use of a once-through cooling system. The intake featured low approach velocity, 1-millimeter mesh screens, flush angled screens with fish buckets, and low-pressure spray (Anderson et al, 1988). Biological evaluations were conducted to determine the number, species, and initial and extended survival of fish impinged on the intake fine screens. It was found that the fragile group (primarily, bay anchovy and Atlantic silverside) had a calculated survival below 25 percent while a “hardy” group, dominated by winter flounder and northern pipefish, had survival values greater than 65 percent (Tenera, 2000).

The Salem Generating Station on the Delaware Bay in New Jersey retrofitted half of its intake vertical flow-through screens with fine mesh Ristoph screens to evaluate the survival rate of the impinged organisms on screen panels. The fine mesh Ristoph screens include these features: fish collection buckets at the bottom of the screen panel, smooth woven mesh with rectangular mesh opening of 1.6 millimeters x 12.7 millimeters, lighter composites screen baskets, and a second trough for fish return. During the tests that were conducted on 19 separate dates between June 20 and August 24, 1996, fish collected from the old and new screens were held separately for an observation period of 48 hours. The only species occurring in sufficient numbers to provide a statistically valid data analysis was juvenile weakfish. Overall, statistic analyses demonstrated a 48-hour survival rate (uncorrected for control mortality) of 57.8 percent with the old screens and 79.3 percent with the new screens. (Tenera, 2000) This offers evidence that screens with fish collection and return will achieve a substantial survival rate of impinged organisms, as opposed to the 100 percent loss of impinged organisms currently occurring at DCPP.

Retrofitting the DCPP shoreline intake with inshore fine screen technology will be a significant improvement over existing situations where larval organisms entrained through the existing screen mesh are considered to be entirely lost. With this technology, the fine screen mesh to be used will have rectangular slot screens, either 1 millimeter x 4 millimeters or 2 millimeters x 6 millimeters. This creates an effective mesh opening of 1 to 2 millimeters, which reduces entrainment of fish egg and larvae. The rectangular mesh size has better hydraulic performance in terms of reduced head loss with screen as it has larger effective opening, as compared to the square mesh of 1 millimeter x 1 millimeter or 2 millimeters x 2 millimeters.

Currently, the approach velocity toward screens is approximately 1 fps, which results in a through-screen velocity of 1.95 fps. For debris load conditions, it is necessary to limit the approach velocity to less than 1 fps. The application of vertical dual flow-type screens versus the existing through-flow screens doubles the screen surface area without demanding any increase in the screen house dimensions. The screen motor drive horsepower will need to have variable speed capability to allow continuous rotation at speed up to 40 feet per minute. This is a major improvement over the current screen rotating speed of 10 to 20 feet per minute. The dual flow screen has its screen face parallel to the water channel. Water will enter both of the ascending and the descending screens faces, and then flow out between these two faces (see Figures IFMS-2 and IFMS-3). The approach velocity toward the dual flow screens is not fully uniform, there will be a significant net reduction in average approach flow velocity (to less than 1 fps) and a much lower average through screen velocity of approximately 1 fps, that is, below the current 1.95 fps.

Each screen will be equipped with a fish collection and return system. Specifically, fish buckets will be added to the bottom of each fine screen panel. Two pressure sprays will be installed. The low-pressure spray (approximately 10 psi) is expected to gently push off collected fish to the return piping (Figure IFMS-1). A follow-on, high-pressure spray will be employed to dislodge debris to the grinder system.

With the use of fine mesh, as described in Section 3.2, entrainment of larval species will be significantly reduced. The collected egg/larvae on the face of the screen panels will be washed off the screen panel via the low-pressure spray and returned back to the ocean through the fish return pipe. Ample flush water will be made continuously available to ensure an adequate water depth is maintained in the return piping.

In summary, the new inshore mechanical (active) fine screen system will greatly improve the marine protection measures associated with the existing intake system. However, this technology still does not meet the 0.5 fps through-screen velocity as proposed in the *California Once-Through Cooling Policy* rule. The inclusion of a fish collection and return system, however, provides crucial additional mitigation measures. Consequently, the use of dual flow-type screens and fine mesh is recommended to be a candidate for further evaluation in Phase 2 of the study.

4.2.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The design of wedge wire screens affect impingement and entrainment reductions in three ways: (1) the screens act as a physical barrier to prevent aquatic organisms sufficiently larger than the screen slot size from being entrained, (2) sweeping current in the source water tends to move the aquatic organisms away from the entrained flow field and reduce impingement by moving organisms past the screen faces, minimizing direct contact with intake, and (3) hydrodynamic exclusion of early life stages results from the small through-slot velocity at the screens.

There have been a large number of previous studies that evaluated effectiveness of wedge wire screens on reducing impingement and entrainment losses. Section 3.6.2 highlights various evaluation and testing results for screens with different slot sizes (narrow slot size [2 millimeters and lower] and larger slot size [more than 2-millimeter slot opening]).

The wedge wire screen technology has been recognized by the industry and accepted by permitting agencies as having the ability to effectively reduce impingement mortality when properly designed. The wedge wire screen technology can be effective in reducing entrainment loss of juvenile and adult fish due to the physical barriers to entry afforded by the wire matrix. Its performance regarding entrainment reduction for larvae and eggs, however, is highly site-specific and is the subject of ongoing assessments and debates. There is currently no site-specific assessment regarding the potential reduction of entrainment impacts from the use of wedge wire screens that could adequately characterize the benefits. However, based on recent field evaluations, studies, and assessments for the cooling water intakes of other power facilities, it is expected that this technology will offer some level of entrainment protection for all life stages, assuming there is a focused screen site selection process that will avoid biologically sensitive and production areas and appropriate consideration is given of the local hydrodynamics of the source water to augment the physical barrier of the screens.

Impingement Reduction

The wedge wire screen technology's ability to achieve significant improvement in impingement mortality by combining a slow design through-slot velocity (on the order of 0.5 fps) with a high sweeping current (1 fps or higher) has been demonstrated in many studies and field evaluations. The wedge wire screen system recommended for DCPP for this evaluation is based on a slot through-flow velocity that does not exceed 0.5 fps and, therefore, will meet the impingement reduction of the *California Once-Through Cooling Policy* rules.

Entrainment Reduction

The wedge wire screen technology is a passive screening system with no moving parts and discourages juvenile/adult fish from entering the intake system because of its narrow screen slot size and low slot through-flow water velocities. Early studies and field evaluations of wedge wire screens have concluded that they have little effect on the number of small fish eggs and larvae entrained. More recent studies focused on reductions in entrainment of larger larvae and reported significant benefits by focusing the protection efforts on older larvae that have a greater likelihood reaching maturity. The recent assessments targets the *relative* ecological value of entrainment losses with the use of equivalent age 1 fish (the number of 1-year-old fish eggs, larvae, and juveniles lost to entrainment that would have reached this age if they had they not been entrained) as the measurement metric, to ensure that mitigation efforts are actually effective at protecting the fish populations. Two particular studies (Enercon, 2010 Normandeau, 2009) have specific entrainment benefit estimates for wedge wire screens using 1-year-old equivalents approach. In the Enercon study performed for Indian Point 2&3 (Enercon 2010), the potential percent reduction of monthly and annual equivalent age 1 impingement and entrainment losses from the regulatory baseline due to use of wedgewire screens with through slot velocity of 0.5 fps was provided, with annual entrainment loss estimate of 89.8 percent for 2-millimeter slot and 89.6 percent for 6-millimeter slot size, and an overall 99.9 percent impingement reduction for all screen slot sizes (1 millimeter to 9 millimeters).

However, some of the findings related to the entrainment reduction have been challenged, particularly in the case of New York State Department of Environmental Conservation's (NYSDEC or Department) April 2, 2010 Notice of Denial ("Notice") regarding assessments of potential impacts of Indian Point Energy Center Nuclear Generating Units 2 and 3 on striped bass and other fish populations. The New York State Department of Environmental Conservation stated that adverse environmental impact should be defined as the total numbers of aquatic organisms killed by a cooling water intake structure, not only age 1 equivalents. The New York State Department of Environmental Conservation further stated that the entrainment reductions estimated in the Indian Point Alternative Technology Report are based on the unproven assumption that hydrodynamics, coupled with active larval avoidance behavior, and not screen slot width, are responsible for most of the entrainment reduction observed with cylindrical wedge wire screens. Moreover, the wealth of available industry literature on this topic (Electric Power Research Institute reports of 1998, 2003, and 2005; Taft 2000; Heuer and Tomljanovich 1978; Uziel et al. 1979; Weisberg, et al. 1987) does not support this assumption.

There are more related studies underway in California. For example, the Redondo Beach for the West Basin Municipal Water District study evaluated impingement and behavior of larvae that encounter the screens but are not entrained. Entrainment reduction with wedge wire screen technology is very site-specific and highly complicated and depends on the combination of many factors, such as the abundance of aquatic organisms, temporal and spatial distribution of aquatic species and their life stages present in the source water, hydrodynamic conditions, and the design of the screens, and the arrangement and placement of the screen assemblies. A definitive demonstration of the entrainment benefit of using wedge wire screens at DCPP that will satisfy the requirements of the *California Once-Through Cooling Policy* rules will require site-specific field testing, and possibly a parallel model analysis.

Even though the total volumetric flow withdrawal will be the same, the wedge wire screens offshore location, combined with screen low through-flow velocity of less than 0.5 fps, will also reduce the fish egg/larvae entrainment losses to some extent. The system effectiveness improves if there are local sea currents sweeping the screen surface that are greater than the slot through-flow velocities. Screen performance is expected to be variable depending on the season and marine species. As shown in the review of various references on wedge wire screen performances on different screen slot sizes (Section 3.6.2), the smaller slot size (such as the 2-millimeter size) will offer the same or better entrainment reduction performance as compared to the coarse slot openings (such as 6-millimeter or 9-millimeter slot). However, smaller slot size screens will likely experience with more debris clogging and biofouling potential than coarser screens and as such, an in situ testing of screens with both a 2-millimeter slot and a 6-millimeter slot will be conducted before an optimum screen size is selected.

4.2.6 Operational Strategies to Reduce Impingement and Entrainment

As described in Section 3.7, 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 the *California Once-Through Cooling Policy* rules.

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

<u>Cooling Water Flow Rate Reduction</u>

DCPP is a baseload 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. Typically, a reduction in water withdrawal rates will likely improve the entrainment loss and associated impingement mortality proportionally. For the correlation between intake flow reduction and the percent plant unit de-rate, as shown in Section 4.2.8, the percent of condenser flow reduction (about the same as the percent intake flow reduction) equals approximately the percent of plant unit de-rating, with the condenser temperature rise remains constant.

Flow reduction capability is limited by the DCPP circulating water system equipment and operating constraints that consist of the following: (1) single-speed cooling water pumps need to operate above their minimum continuous flow rated design, (2) a minimum number of operating pumps are required (one per unit) to supply cooling water to the condensers, and (3) 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 *California Once-Through Cooling Policy* requirements.

The required through-screen 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 an 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 a baseload 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 16 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.

<u>Fish-Deterrent Systems</u>

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 barrier 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 deterrent 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 in air-filled cavities in 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 the *California Once-Through Cooling Policy* rules.

4.2.7 Source Water Substrate Filtering/Collection Systems

The current DCPP shoreline intake system permits fish to enter the onshore pump intake structure directly. There are six traveling water screens per unit with a flow-through velocity of 1.95 fps. With the use of a source water substrate filtering collection system in lieu of the open intake system, no juvenile/adult fish can enter the intake system. Entrainment of fish egg/larvae would be mostly eliminated by the substrate filtering system.

The source water substrate filtering collection system technology is a passive system with no moving parts. Fish egg/larvae and juvenile/adult fish exclusions are effectively screened from entering the system through a combination the filtering action of the bottom sediments and the low inflow velocities at the surface of the substrate. The design velocity is not expected to exceed 0.5 fps and so meets the Track 1 impingement criterion associated with the *California Once-Through Cooling Policy*. Even though the total volumetric flow withdrawal will be the same, the substrate filtration and low withdrawal velocities will result in significantly less fish egg/larvae entrainment relative to the existing system. The system effectiveness improves with the existence of sufficient sea current velocities sweeping the substrate clear of vegetation and other blocking debris.

4.2.8 Variable Speed Cooling Water Pumping Systems

The primary expectation of using the variable frequency drive or variable speed pump is to reduce the cooling water intake structure cooling water flow withdrawal to an acceptable level that will comply with the impingement mortality and entrainment reduction objectives of the *California Once-Through Cooling Policy* rules. As stated in Section 3, the two main factors that will influence the required cooling water flow are the plant load generation and the intake water temperature. (Raising the temperature rise across the condensers is not considered a viable alternative to reducing cooling water flow rate because of the potential to increase thermal discharge impacts and reduce steam cycle system performance.)

As a baseload plant, DCPP is designed to operate at full capacity except during maintenance, repair, and refueling. Some benefits of the variable speed pump system may be attained by reducing load generation 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, attainable with the use of variable speed pumps alone, will reach a level commensurate with that of a closed-cycle wet cooling system. For instance, assuming conservatively that the off-peak season lasts 6 to 8 months of the year, and generation load and the corresponding cooling water flow could be reduced by 30 percent, and understanding the current practical limit of large-capacity variable speed circulating water pumps, the annual withdrawal volume and associated impingement mortality and entrainment loss would be 15 to 20 percent. Further, according to a Tenera field study from late 1996 to mid-1998 (Tenera, 2000), the density of some of the 16 larval fish taxa collected at the DCPP intake was typically higher in late winter and spring months, but there are other species, such as snailfishes, sanddads, speckled sanddads, and Pacific sanddads, that peaked in the summer months. The varying seasonality in the density of different larval fish suggests that not all organisms would benefit equally from the use of variable speed pumps to achieve flow reduction during off- peak seasons.

Some level of flow reduction can be a direct result of lower intake water temperature. The daily mean seawater temperature ranges from approximately 10.5°C (50.9°F) in May to approximately 15°C (59°F) in September at DCPP. 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 data from 1996 to 2012 recorded at half-hourly interval) at 22°C (71.6°F) and 8.4°C (47.1°F). For a baseload plant like DCPP, the maximum expected flow reduction ranges from 2 to 10 percent for a fully loaded plant, even when ocean water temperatures are below 11.1°C (38.2°F) (Tenera, 2000). Therefore, varying the pump speed to achieve this level of flow reduction would improve entrainment and impingement only marginally. Currently, the normal through-screen velocity at the traveling water screen is 1.95 fps (Tetra Tech, 2002) at full load operation. A flow reduction of up to 10 percent will reduce the impingement velocity to approximately 1.76 fps, which is still much higher than the target 0.5 fps for the consideration of impingement reduction.

In theory, the through-screen velocity at the traveling water screens could be lowered to 0.5 fps or less, if the cooling water flow would be reduced by 75 percent or more. This severe flow reduction, however, renders the two circulating water pumps per unit inoperable due to the potential practical limit of 15 to 30 percent flow reduction achievable with the variable speed pump technology for pumps in this size range. Even if there was a practical means to deliver this flow to the plant, the reduction in output of the plant would be reduced by over 50 percent. Finally, an EPRI study (EPRI 2007) concludes that such reduction in load may have significant impacts to the electric generation supply to the grid during periods when this power is needed most.

The specific generation output under different de-rating scenarios versus condenser flow reduction due to the use of the variable speed pumps can be determined based on acceptable condenser back-pressure, design condenser inlet temperature, and condenser cleanliness factor. However, the calculated generation outputs for different condenser flow rate will show a much higher condenser temperature rise with reduced flow as compare to the baseload condition. For this assessment, it is necessary to ascertain that the condenser temperature rise be kept constant for different plant de-rating conditions, so as not to cause thermal discharge permitting and thermal impacts issue at discharge. In such a case, the amount of plant de-rate as a result of variable speed pump operation will closely match the amount of condenser flow reduction as described above and the resulting proportional entrainment reduction. Therefore, for example, for a condenser flow reduction of 10, 20, and 30 percent, the expected plant de-rate required will be about the same percentage and the expected entrainment loss reduction will also be 10, 20, and 30 percent, respectively.

Because of its marginal ability to reduce impingement and entrainment impacts, the variable speed pump technology, when used alone, is deemed inadequate in meeting the requirements of the *California Once-Through Cooling Policy* rules.

4.3 Offsetting Environmental Impacts

4.3.1 Closed-Cycle Cooling Systems

The environmental offsets are an environmental management tool that 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 broad-based, multidisciplinary review process that 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 the with construction and operation of the closed-cycle systems from a broad range of environmental evaluation criteria.

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 each closed-cycle system technology. 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 that 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 Tables CC-13 through CC-17.

4.3.1.1 Dry Cooling Systems — Passive Draft Dry/Air Cooling and Mechanical (Forced) Draft Dry/Air Cooling

Air

Fugitive dust from earthwork and concrete activities associated with development of the passive draft dry/air cooling and the mechanical (forced) draft dry/air cooling tower systems could be significant. Diesel and gasoline engine emissions-related air emissions can be expected from workforce personal vehicles, over-the-road project, and off-road construction vehicles and equipment. Construction supplies and related circulating piping-related equipment deliveries may be significant in the early phases of construction. Collectively, these transient air quality impacts can be characterized as small negative.

As opposed to the wet form of this tower system, the cooling water in these dry processes is wholly maintained within a closed system. There are no drift losses and no condensed plume. Consequently, there are no particulate (salt) emissions or related impacts from these tower systems.

The passive draft dry/air cooling or the mechanical (forced) draft dry/air tower system will likely have a minor negative impact on DCPP's overall plant efficiency due to increases in cooling water temperature relative to the existing once-through system. The resulting decreases in power generation may result in minor increases in greenhouse gas or other pollutant emissions locally if the replacement power comes from fossil power sources.

The saltwater tower operational impacts (deposition, corrosion, visibility) collectively represent a small negative impact.

Surface Water

The addition of saltwater passive draft dry/air cooling or the mechanical (forced) draft dry/air towers may involve some marine-based construction activities to modify the intake system for the limited need to withdraw seawater to initially charge the system. The work will not generate significant water quality impacts. The construction efforts associated with building the cooling tower structures are expected to result in significant land-based disturbance and storm water-related impacts. Collectively, these surface water impacts are characterized as a moderate negative impact.

The saltwater-supplied passive draft dry/air cooling or the mechanical (forced) draft dry/air system will substantially reduce seawater withdrawal rates even relative to a wet cooling systems because there are no blowdown, drift, or evaporative losses. The only saltwater demand is the initial charging of the system and the minimal makeup for system leakage or other minor maintenance losses. The fresh and reclaimed water use rates could also be used to charge the cooling system, Freshwater surface water used for industrial cooling purposes poses a small negative impact, in that such a valuable resources is generally devoted to a higher use (potable water, recreational use). The small impact is related to the small volume of freshwater that will be used in this system. Industrial use of this wastewater provides a small positive benefit, as this process reduces the overall volume of the final effluent reaching the environment.

Groundwater

While groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), there are likely sufficient existing onsite water supplies to satisfy these needs.

Onsite groundwater resources will not be used in support of saltwater passive draft dry/air cooling or the mechanical (forced) draft dry/air tower operation. However, this water resource could be used to satisfy or contribute to the operational water needs of the freshwater passive draft dry/air cooling or the mechanical (forced) draft dry/air towers or used to supplement the water needs of the reclaimed water cooling tower system.

Groundwater used for industrial cooling purposes poses a moderate negative impact, in that such a valuable resource is generally devoted to a higher use (potable water, recreational use).

Waste

Limited construction-related wastes will result from the refashioning of the existing inshore portions of the intake system to supply the initial charge of saltwater. The proposed location of the towers, a complex terrain area north of the power block area, will demand considerable earthwork to produce a workable foundation arrangement for the large rectangular tower systems. The associated earthwork material balance has not been prepared for this initial phase of the assessment. The final disposition of these materials has not been determined. Most of the non-soil-related construction wastes are expected to have salvage value and therefore, will not represent a burden to offsite disposal facilities. Disposal of surplus soil/rock or marine spoils, whether directed to an onsite or offsite disposal area, will represent a moderate construction negative impact.

The maintenance program is likely to generate additional wastes (lubricants, fill repair, pipe and valve refurbishment). Collection and disposal of these maintenance wastes, therefore, can be categorized an operational small negative impact.

Noise

The San Luis Obispo County General Plan and Local Coastal Plan limits noise levels to 70 dBA at the property line of the affected public area (Tetra Tech, 2008). Noise impacts from construction activities associated with the passive draft dry/air cooling or the mechanical (forced) draft dry/air towers could be significant, but distance to the nearest offsite public property line is significant. The limited effort to refashion the nearshore intake system is not expected to generate significant noise impacts for land-based locations. Buffer areas around offshore construction zones could be established for safety reasons, but it is unlikely they will be needed. PG&E owns all coastal properties north of Diablo Creek to the southern boundary of Montana de Oro State Park and all coastal properties south of Diablo Creek for approximately 8 miles, so the potential for construction-related noise impacts to the public along property boundaries or shoreline areas is unlikely.

Operational noise levels are expected to increase because of passive draft dry/air cooling tower-related motors, and power transmission unit elements. The mechanical (forced) draft dry/air units will also have fans. While the noise-related impacts to onsite occupied buildings could rise above the target exposure limit, noise limits will not be enforced on DCPP property. The impact to operational noise levels from passive draft dry/air cooling or the mechanical (forced) draft dry/air tower operation and the resulting impacts to occupied onsite area are minimal.

Land Use

Construction activities associated with this system will be confined to a sloped area north of the power block area that, though unoccupied, may have undergone some alteration during the course of DCPP construction and operation. Only half of the necessary passive draft dry/air cooling tower (six) systems will fit within the current DCPP property boundaries. Only one of the two large mechanical (forced) draft dry/air air-cooled systems (1590 feet by 760 feet) will fit within the current DCPP property boundaries. So the property boundaries will need to be expanded to accommodate the second unit's cooling facility. The addition of a dry cooling system will represent a fundamental change to an area that has largely not been used for direct power plant operations and a significant expansion of the boundaries of the DCPP site. Limited marine construction activities will also be conducted near the existing inshore intake system with minimal impact to land use of this already developed area. The significant construction activities associated with the new cooling tower result in a large construction-related negative impact for this cooling technology option. The passive draft dry/air cooling or mechanical (forced) draft dry/air system and the modified inshore intake system collectively pose significant changes to the existing land use and DCPP property boundaries. This new cooling tower area will become part of the operating power plant with all of the attendant security and maintenance provisions. The modified intake system could represent a limited (at best) change to land use in previously undeveloped subaqueous areas adjacent to the existing nearshore portions of the existing intake system. Given these impacts, the dry cooling tower systems are expected to offer an operational large negative impact.

Marine Ecological Resources

Reconfiguring inshore portions of the existing intake system to supply saltwater to the passive draft dry/air cooling or mechanical (forced) draft dry/air towers will result in insignificant impacts to an already nearshore area—little or no negative impact. Construction of the freshwater and reclaimed water-supplied tower system will have no effect on marine resources relative to other options.

Operationally, the saltwater passive draft dry/air cooling or mechanical (forced) draft dry/air cooling system can effectively mitigate impacts to marine resources by limiting the through-screen velocity to less than 0.5 fps and reduce entrainment impacts because of its substantially reduced water withdrawal rate. The fresh or reclaimed water-supplied tower system completely avoids a seawater withdrawal and so completely avoids operational impacts to marine resources. It is important to note that the current DCPP once-through system results in the lowest impingement biomass rate (weight/gallons of water withdrawn) of all coastal power plants (Tenera, 2011). This is due primarily to its relatively confined engineering cove and exposed rocky coast that create a localized environment where the local fish and shellfish population adapted to strong coastal currents and variable ocean surges making them somewhat resistant to the flow dynamics of cooling water intake systems. This offshore intake system will not, by itself, reduce the overall water withdrawal or discharge rates. The thermal discharge impacts to aquatic life will remain largely unchanged. So while the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system is a fully regulatory compliant system, its positive attributes are somewhat tempered by the unusually effective performance of the existing intake system. The regulatory compliance attribute, however, is still sufficient to categorize the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system as a large positive impact.

Terrestrial Ecological Resources

The passive draft dry/air cooling or mechanical (forced) draft dry/air towers will be constructed in a largely unoccupied area on the DCPP plant property situated north of the power block area and the intervening Diablo Creek. Areas outside of the existing DCPP property will be needed. The air-cooled system will be situated on lands that may have been altered during the course of DCPP construction and operation and on previously undeveloped land beyond the DCPP site boundary. Consequently, some of these areas are expected to include ruderal species of nonnative grades and broadleaf weeds. There will be more grassland and chaparral habitats in less disturbed upland portions of this proposed development area situated outside of the plant boundary. Consequently, the tower area is expected to limited habitat potential and limited wildlife use. However, there will also be the potential for impacts from the circulating water piping that will need to cross the intervening Diablo Creek sensitive riparian habitat area. There are various crossing systems that could be used to minimize impacts to this area (directional boring, elevated structures). Collectively, construction of the tower system is expected to pose a moderate negative impact.

The fully constructed tower system will permanently occupy previously undeveloped land with some modest habitat value and impact small portions of the more sensitive and valuable riparian habitat along Diablo Creek. This also equates to an operational moderate negative impact.

Cultural and Paleontological Resources

As described above, construction of the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system will be constructed in an unoccupied portion of the DCPP property that may have undergone some previous alteration and some adjacent areas beyond the site boundary. There may be some limited construction activities across linear tracts across the Diablo Creek area. These work areas are inland of the well documented cultural resource area (Central Coast Chumash ancestral burying ground) located near the mouth of the Diablo Creek (Enercon, 2009). While the proposed tower areas have not been previously identified as having significant cultural or paleontological resource potential, such resources could be encountered during the course of construction. Installation of the modified intake system will be largely confined to previously disturbed subaqueous land, so there is little potential to encounter cultural or paleontological resources in that submerged area. Consequently, construction of the tower system is expected to pose a small negative impact.

The fully constructed tower system will permanently occupy previously undeveloped land so there is some potential for permanent loss of areas with cultural or paleontological resources. The same is true for the near-shore intake facility. Collectively, operation of the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower system could pose a small negative impact to cultural and paleontological resources.

Visual Resources

Construction of the tall passive draft dry/air cooling towers and even the lower profile mechanical (forced) draft dry/air system on the elevated terrain north of the power block area will still represent a significant change to this largely undeveloped area. Construction of the towers will pose a large negative impact.

The operating passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower structures will not generate a visible plume, but its physical presence will still be intrusive to the local coastal area, which is dominated by undeveloped complex terrain (Irish Hills). Operation of these towers will still, therefore, pose a large negative impact.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during construction of the passive draft dry/air cooling or mechanical (forced) draft dry/air tower system. The construction period means that related traffic impacts will not be transitory and the peak workforce may be significant. The estimated construction duration and workforce needs are described further in Section 4.8. Consequently, the transportation-related construction impacts should be considered a small negative impact.

Operationally, the passive draft dry/air cooling or mechanical (forced) draft dry/air tower system will increase maintenance and service requirements, but any related maintenance staff increases are expected to be modest. The air-cooled system will not produce a visible plume and will not pose supplemental fogging or icing impacts. Consequently, this system will not pose any significant operational transportation impacts.

Socioeconomic Issues

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

Operational maintenance staff levels will increase in response to increased cooling tower and intake system maintenance and corrosion impacts (saltwater-supplied system only), but will not result in any related community service or resource concerns.

The impact to local housing and land prices is not expected to be significant, in that there are few if any privately held properties near to the facility.

Summary

Tables CC-13 and CC-14 summarize the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the passive draft dry/air cooling or mechanical (forced) draft dry/air cooling tower systems. The construction impacts are dominated by the moderate negative impacts to land use, terrestrial resources and the visual prominence of these tower structures on a previously undeveloped area of DCPP property and the adjoining area.

Operationally, the dry/air cooled towers offer a mixed story regarding environmental impacts. The dry/air cooling system avoids the particulate emission and visual plume issues, but it still poses significant land use and visual impacts. These negative impacts are tempered by this closed-cycle cooling technology's ability to effectively mitigate the impingement, entrainment, and thermal impacts to marine life associated with the current once-through system. Viewed collectively, the construction and operational environmental impacts of passive draft dry/air cooling or mechanical (forced) draft dry/air cooling towers (all water supply options) offer no clear overall consensus.

4.3.1.2 Wet Cooling Systems – Wet Natural Draft Cooling, Wet Mechanical (Forced) Draft Cooling and Hybrid Wet/Dry Cooling

Air

Fugitive dust from earthwork and concrete activities associated with development of the wet tower systems could be significant. Diesel and gasoline engine emissions-related air emissions can be expected from workforce personal vehicles, over-the-road project, and off-road construction vehicles and equipment. Construction supplies and related circulating piping-related equipment deliveries may be significant in the early phases of construction. Collectively, these transient air quality impacts can be characterized as small negative.

From previous studies (Tetra Tech, 2008), it is clear that a saltwater wet tower system will generate significant particulate emissions in quantities that will exceed the major source threshold for PM-10 (estimated 992 tons/year). The resulting deposition of salt from these cooling tower drift emissions will impact salt-sensitive species and increase onsite equipment corrosion potential. Related corrosion repairs could generate upwards of 50 tons of volatile organic compounds from resurfacing and painting of impacted equipment. Obviously, these impacts would be reduced when considering fresh and reclaimed water supplies.

The particulate (salt drift) emission may also pose 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. The closest Class I areas to DCPP are Ventana Wilderness and San Rafael Wilderness. See Figure CC-15 for the location of these areas.

The wet tower systems will likely have a minor negative impact on DCPP's overall plant efficiency, due to increases in cooling water temperature relative to the existing once-through system. The resulting decreases in power generation may result in minor increases in greenhouse gas or other pollutant emissions locally, if the replacement power comes from fossil power sources.

The saltwater wet tower operational impacts (deposition, corrosion, visibility) collectively represent a large negative impact. The freshwater and reclaimed water pose reduced air quality impacts, because the more limited PM-10 emissions associated with this water supply.

Surface Water

The addition of saltwater wet towers may involve some marine-based construction activities to modify the intake system for the reduced closed-cycle cooling system withdrawal rates, which will have the potential to generate some water quality impacts. Construction of the modified intake system may result in localized turbidity impacts. The construction efforts associated with building the cooling tower structures are expected, however, to result in significant land-based disturbance and storm water-related impacts. Collectively, these surface water impacts are characterized as a moderate negative impact.

The saltwater tower system will substantially reduce seawater withdrawals rates (+90 percent reduction). Obviously, the fresh and reclaimed water usage rates will be further reduced relative to the seawater withdrawal because of the increased cycles of concentrations that are possible for these higher quality water resources.

Freshwater surface water used for industrial cooling purposes poses a moderate negative impact, in that such a valuable resources is generally devoted to a higher use (potable water, recreational use). Industrial use of this wastewater provides a small positive benefit, as this process reduces the overall volume of the final effluent reaching the environment.

Groundwater

While groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), there is likely sufficient existing onsite water supplies to satisfy these needs.

Onsite groundwater resources will not be used in support of saltwater wet tower operation. However, this water resource could be used to satisfy or contribute to the operational water needs of the freshwater wet towers or used to supplement the water needs of the reclaimed water cooling tower system.

Groundwater used for industrial cooling purposes poses a moderate negative impact, in that such a valuable resources is generally devoted to a higher use (potable water, recreational use).

Waste

Construction-related wastes will result from the reconfiguring of the existing inshore portions of the intake system to supply reduced water needs of these cooling systems. The proposed location of the towers, a sloped area north of the power block area, will demand considerable earthwork to product a workable stair-step arrangement for the individual tower foundations. The associated earthwork material balance has not been prepared for this initial phase of the assessment.

The final disposition of these materials has not been determined. Most of the non-soil-related construction wastes are expected to have salvage value and, therefore, will not represent a burden to offsite disposal facilities. Disposal of surplus soil/rock or marine spoils, whether directed to an onsite or offsite disposal area, will represent a moderate construction negative impact.

The maintenance program is likely to generate additional wastes (lubricants, fill repair, pipe and valve refurbishment). Collection and disposal of these maintenance wastes, therefore, can be categorized an operational small negative impact.

Noise

The San Luis Obispo County General Plan and Local Coastal Plan limit noise levels to 70 dBA at the property line of the affected public area (Tetra Tech, 2008). Noise impacts from construction activities associated with the wet towers could be significant, but distance to the nearest offsite public property line is significant. The construction of the reconfigured nearshore intake system is not expected to generate significant noise impacts for land-based locations. Buffer areas around offshore construction zones could be established for safety reasons, but it is unlikely they will be needed. PG&E owns all coastal properties north of Diablo Creek to the southern boundary of Montana de Oro State Park and all coastal properties south of Diablo Creek for approximately 8 miles, so the potential for construction-related noise impacts to the public along property boundaries or shoreline areas is unlikely.

Operational noise levels are expected to increase because of related motors, power transmission units, and fans for the mechanically driven wet tower systems (wet mechanical [forced] draft cooling and hybrid wet/dry cooling) and from cascading water effects for all of the wet tower systems. While the noise-related impacts to onsite occupied buildings could rise above the target exposure limit, noise limits will not be enforced on DCPP property. The impact to operational noise levels from wet cooling tower operation and the resulting impacts to occupied onsite area are minimal.

Land Use

Construction activities associated with this system will be confined to a sloped area north of the power block area (still within the site boundary) that, though unoccupied, may have undergone some alteration during the course of DCPP construction and operation. The addition of wet cooling towers will represent a fundamental change to an area that has largely not been used for direct power plant operations. Limited marine construction activities will also be conducted near the existing inshore intake system with minimal impact to land use of this already developed area. The significant construction activities associated with the new cooling tower represent a moderate construction-related negative impact for this cooling technology option.

The wet tower systems and the modified inshore intake system collectively pose significant changes to the existing land use. The new cooling tower area will become part of the operating power plant with all of the attendant security and maintenance provisions. The modified intake system could represent a limited (at best) change to land use in previously undeveloped subaqueous areas adjacent to the existing nearshore portions of the existing intake system. Given these impacts, wet cooling tower systems are expected to offer a moderate term negative impact.

Marine Ecological Resources

Reconfiguring inshore portions of the existing intake system to supply saltwater to the wet cooling towers will result in minor localized turbidity impacts and some minor impacts to the nearshore marine area—little or no negative impact. Construction of the freshwater and reclaimed water-supplied tower systems will have no effect on marine resources.

Operationally, the saltwater wet cooling tower systems can effectively mitigate impacts to marine resources by limiting the through-screen velocity to less than 0.5 fps and reduce entrainment impacts because of its substantially reduced water withdrawal rate. The fresh or reclaimed water-supplied tower system completely avoids a seawater withdrawal and so completely avoids operational impacts to marine resources. It is important to note that the current DCPP once-through system results in the lowest impingement biomass rate (weight/gallons of water withdrawn) of all coastal power plants (Tenera, 2011). This is due primarily to its relatively confined engineering cove and exposed rocky coast, which create a localized environment where the local fish and shellfish population adapted to strong coastal currents and variable ocean surges making them somewhat resistant to the flow dynamics of cooling water intake systems. So while the wet cooling tower systems are a fully regulatory compliant system, their positive attributes are somewhat tempered by the unusually effective performance of the existing intake system. The regulatory compliance attribute is still sufficient to categorize the wet cooling tower system as a large positive impact.

Terrestrial Ecological Resources

The wet towers will be constructed in a largely unoccupied area of the DCPP plant property, which is situated north of the power block area and the intervening Diablo Creek, but still within the DCPP property boundary. The tower locations will be situated on lands that may have been altered during the course of DCPP construction and operation. Consequently, some of these areas are expected to include ruderal species of nonnative grades and broadleaf weeds. There may also be some grassland and chaparral habitats in less disturbed upland portions of this proposed development area. Consequently, the tower area is expected to limited habitat potential and limited wildlife use. However, there will also be the potential for impacts from the circulating water piping that will need to cross the intervening Diablo Creek sensitive riparian habitat area. There are various crossing systems that could be used to minimize impacts to this area (directional boring, elevated structures). Collectively, construction of the tower system is expected to pose a moderate negative impact.

The fully constructed tower system will permanently occupy previously undeveloped land with some modest habitat value and impact small portions of the more sensitive and valuable riparian habitat along Diablo Creek. This also equates to an operational moderate negative impact.

Cultural and Paleontological Resources

As described above, construction of the wet cooling tower system will be constructed in an unoccupied portion of the DCPP property that may have undergone some previous alteration. There may be some limited construction activities across linear tracts across the Diablo Creek area. These work areas are inland of the well documented cultural resource area (Central Coast Chumash ancestral burying ground) located near the mouth of the Diablo Creek (Enercon, 2009). While the proposed tower areas have not been previously identified as having significant cultural or paleontological resource potential, such resources could be encountered during the course of construction. Installation of the refashioned intake system will be largely confined to previously disturbed subaqueous land, so there is little potential to encounter cultural or paleontological resources in that submerged area. Consequently, construction of the wet tower systems is expected to pose a small negative impact.

The fully constructed tower system will permanently occupy previously undeveloped land so there is some potential for permanent loss of areas with cultural or paleontological resources. The same is true for the near-shore intake facility. Salt deposition and plume impaction from saltwater tower operation could accelerate the decay of local surface resources. Collectively, operation of the wet tower system could pose a small negative impact to cultural and paleontological resources.

Visual Resources

Construction of the tall wet natural draft cooling towers will demand equally tall construction equipment (for example, cranes, scaffolding). As the towers get larger during the course of development, the visual impacts will increase and becoming increasingly out of character with the low profile structures in the area. Construction of the lower profile wet mechanical (forced) draft towers and hybrid wet/dry cooling towers on the elevated terrain north of the power block area will still represent a significant change in the largely undeveloped area. Construction of all of the wet tower options will pose a moderate negative impact.

The operating wet natural draft cooling and wet mechanical (forced) draft cooling towers with their potentially towering unabated plume will be very visually intrusive to the local coastal area, which is largely composed of undeveloped complex natural terrain (Irish Hills). These towers and associated plumes will also represent potential hazards to local aviation. Operation of these towers will pose a large negative impact.

The hybrid wet/dry cooling tower structure will include plume abatement features, which are expected to largely avoid the generation of visible plumes. While this will lessen the visual impacts of operation, the hybrid wet/dry cooling towers will remain a prominent feature on a previously undeveloped area. Operation of these towers will, therefore, pose a moderate negative visual impact.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during construction of the wet tower systems. The estimated duration of construction activities and workforce requirements are described further in Section 4.8. Consequently, the transportation-related construction impacts should be considered a small negative impact.

Operationally, the wet tower systems will increase maintenance and service requirements, but any related maintenance staff increases are expected to be modest. Operation of the wet natural draft cooling and wet mechanical (forced) draft cooling tower systems also has the potential to increase the hours of local fogging (and to lesser extent icing) on the limited nearby road systems. The fogging impacts could also impact local aviation and boating. The fogging impacts from tower operation qualify as a moderate negative impact. The hybrid wet/dry cooling tower system has only very limited potential to increase local fogging conditions, so this system only poses a small negative impact.

Socioeconomic Issues

While there will be additional construction-related employment opportunities, those opportunities associated with construction of the wet tower systems are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).

Operational maintenance staff levels will increase in response to increased wet cooling tower and intake system maintenance and corrosion impacts (saltwater towers only), but will not result in any related community service or resource concerns.

The impact to local housing and land prices is not expected to be significant, in that there are few if any privately held properties near to the facility.

Summary

Tables CC-13 through CC-17 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the wet cooling tower systems. The construction impacts are dominated by the moderate negative impacts to terrestrial resources and the visual prominence of building these tower structures on a previously undeveloped, elevated area of DCPP property.

Operationally, the wet cooling towers offer a diverse story regarding environmental impacts. The tall profile wet natural draft cooling towers and their condensed plumes generate significant negative visual impacts. The wet mechanical (forced) draft cooling tower, though lower profile, also generates significant plume impacts. The towering plumes may increase the frequency and severity of local fogging conditions leading to hazardous road, flying, and boating conditions. Only the hybrid wet/dry cooling tower plume abatement features effectively mitigate the plume visual resource and transportation impacts of the other tower systems.

The saltwater wet towers all pose significant deleterious air quality and corrosion impacts from cooling tower drift salt emissions. These clearly large negative impacts are tempered by this closed-cycle cooling technology's ability to effectively mitigate the impingement, entrainment, and thermal impacts to marine life associated with the current once-through system. Viewed collectively, the construction and operational environmental impacts of the wet saltwater towers have a definitive overall negative impact. The other water supply options offer no clear overall positive or negative consensus.

4.3.2 Once-Through Cooling System Intakes

The environmental offsets are an environmental management tool that 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 the once-through cooling intake systems from a broad range of environmental evaluation criteria.

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 deepwater intake 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 that 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 Tables DW-2, WW-2, IR-3, IFMS-2, SW-2, CS-2, and VS-2.

Air

The air quality impacts associated with the installation of the once-through cooling systems are small given that the primarily construction activities are confined to onshore strips of previously developed land and marine environments. While some of the options involve onshore demolition work and erection of new structures, in general, offsite fugitive dust impacts will be minimal. While some of the options involve onshore demolition work and erection of new structures, in general, offsite fugitive dust impacts will be minimal. 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 may be necessary for the options requiring more onshore work, and there may be some emission sources on temporary offshore platforms or barges for the deepwater, offshore intake relocation, and offshore wedge wire screen systems. Construction supplies and piping-related equipment deliveries may be significant in the early phases of construction for the deepwater intake, offshore wedge wire, offshore intake relocation, and substrate filtering systems.

The offshore systems (deepwater intake, wedge wire, intake relocation, substrate filtering) may result in a decrease in DCPP overall plant efficiency due to increased pumping power demands associated with a more distant offshore deeply submerged or buried intake systems. The resulting power reduction is not expected to produce any tangible increase in greenhouse gas or other pollutant emissions from possible replacement fossil fuel-based power sources.

The remaining systems may actually serve to marginally reduce internal plant power demands or have little appreciable impact. Therefore, operation of these remaining once-through cooling intake systems will not reduce baseload power production—reductions that would have to otherwise be offset by offsite power sources.

Surface Water

Deepwater intake system construction activities are primarily marine-based and they have the potential to generate significant water quality impacts. Placement of the velocity cap and connecting piping will result in localized turbidity impacts from disruption of the local seabed. Since the connecting piping systems to the velocity cap can be installed via a tunneling (tunnel boring machine), and so this impact can be reduced to a moderate negative level. The relocated shoreline system construction activities include the placement of the velocity cap over the downshaft to the underground tunnel, and will result in some localized turbidity impacts from disruption of the local seabed. Since the connecting piping systems to the velocity cap are installed via tunneling (tunnel boring machine), this impact can be characterized as moderate negative. Construction of the inshore fine screen system and connecting piping are primarily marine-based and will result in localized turbidity impacts from disruption of the local seabed—a moderate negative impact. Placement of the wedge wire modular screens and connecting piping will result in localized turbidity impacts from disruption of the local seabed—a potentially large negative construction impact if cut-and-fill practices are used, but which can be reduced by a moderate level via the tunneling option. Placement of the parallel and connecting piping associated with the substrate system will result in localized turbidity impacts from disruption of the local seabed—a potentially large negative construction impact if cut-and-fill practices are used, which can be reduced to a moderate level via the tunneling option. All of these once-through cooling intake system construction efforts may pose some limited land disturbance impacts (especially when onshore structures are added) and related storm water-related impacts. These once-through cooling systems will not change the overall cooling water withdrawal rate or discharge rates.

Given the limited nature of the construction needed to implement operational strategies system or install the variable speed cooling water pump system, no significant additional surface water resources will be needed and there be little or no new land disturbance or related 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 impact any appreciable marine life benefits that could be tied directly 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.

During periods of reduced power output, the variable cooling water pump system option will withdraw less saltwater resulting in a parallel reduction of impingement- and entrainment-related losses of marine life and a reduction of local thermal impacts from the reduced cooling water discharge. This represents a small positive impact relative to the current condition.

Groundwater

Given the primarily offshore construction environment associated with the installation of the once-through cooling intake systems, no significant additional groundwater resources will be needed.

The once-through cooling intake systems are not expected to require any additional groundwater resources.

Waste

The deepwater, offshore wedge wire, offshore intake relocation, and substrate filtering intake systems construction-related waste, including marine bed sediment and recyclable metals associated with surplus piping and marine tunneling spoils are expected to be considerable. The final disposition of these materials has not been determined. Most of the piping and related metal wastes are expected to have salvage value and, therefore, will not represent a burden to offsite disposal facilities. The inshore fine screen system and intake relocation will also generate construction-related wastes, which will primarily be composed of marine bed sediment and waste concrete from the existing inshore systems. Disposal of the marine sediment, whether directed to an onsite or offsite disposal area from these once-through cooling intake options, will represent a moderate construction negative impact.

The plant loss during storm events from kelp forests in the area has the potential to impact the proposed offshore and nearshore intake systems. DCPP's existing intake system has been impacted during these events, that is, kelp debris was entrained into the cooling water withdrawal system. This situation will continue to be an issue for the inshore fine mesh mechanical system. Consequently, this system will continue to demand physical inspection and cleaning processes as part of the maintenance program. Collection and disposal of these additional marine wastes, therefore, can be categorized as a moderate operational negative impact.

The kelp studies available for review did not address impacts to intake systems in deeper water, such as deepwater, wedge wire, intake relocation, and substrate filtering systems. Dislodged naturally buoyant kelp debris may be expected to remain at or near the surface while being transported to the shoreline during these storm events, avoiding the offshore intake systems Consequently, the kelp loading issues of current concern may not be exacerbated by implementation of the deeper offshore intake systems (deepwater intake, wedge wire screen, and substrate filtering systems). Operation of the deepwater intake, intake relocation, and offshore wedge wire system may include self-cleaning capability. These offshore intake systems and the substrate filtering system are likely to demand physical inspection and cleaning of offshore components and they all have the potential to generate additional biological wastes (vegetative debris). Assuming no significant kelp debris issues, collection and disposal of these marine wastes could represent a moderate operational negative impact.

The variable shore cooling pump installation will generate demolition wastes from removal of the existing pumping system. Most of these wastes (concrete, piping, pumps, and wiring) will have salvage value and, therefore, will not represent a burden to offsite disposal facilities. Operation of the variable speed cooling water pump system is not expected to generate any additional wastes.

Construction-related waste, including recyclable metals from any related alterations of the previous cooling water pumping system related to implementation of operational strategies, could be generated. These wastes are expected to be minor and will 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

The San Luis Obispo County General Plan and Local Coastal Plan limit noise levels to 70 dBA at the property line of the affected public area (Tetra Tech, 2008). Noise impacts from construction activities for the deepwater intakes, offshore wedge wire system, offshore relocated intake, and substrate systems are not expected to be significant for public land-based locations, since the primary work areas will be in be onsite, nearshore, or well offshore. Buffer areas around offshore construction zones will likely be established for safety reasons, but will also serve to reduce noise impacts to offshore noise receptors (watercraft) and shoreline areas that have public access. Given that PG&E owns all coastal properties north of Diablo Creek to the southern boundary of Montana de Oro State Park and all coastal properties south of Diablo Creek for approximately 8 miles, the potential for construction-related noise impacts to the public along shoreline areas is unlikely. Consequently, the construction activities are expected to pose little or no additional noise impact.

Noise levels from implementation activities for these operational strategies will be largely unchanged, since the related construction work is limited.

Noise levels from construction activities for the variable speed pumping system will be largely unchanged because the primary work areas will be wholly inside existing buildings.

Operational noise levels are expected to be largely unchanged following installation of any of the once-through cooling intake system options.

Land Use

Construction activities associated with deepwater intake, offshore wedge wire, offshore intake relocation, and substrate systems have near or onshore and offshore components. However, given the 1 mile exclusion zone around the facility, related land use impacts and restrictions regarding public access restriction are not relevant. If the deepwater intake option extends beyond this zone, the related construction activities could briefly preclude normal recreation activities in the waters in the immediate construction zone. Buffer zones would be created, if necessary, and maintained during the course of construction. This restriction, if enacted for the deepwater intake system, would pose a small negative construction impact.

Similarly, the fully operational deepwater intake system that extended beyond the exclusion zone would represent a change in land use of the previously undeveloped submerged lands. The offshore cap system will be located in relatively deep water (if greater than 1 mile offshore) and should not represent an impediment to surface navigation, although surface buoys could be a consideration. Should this system extend beyond the exclusion zone, its operating impacts could offer a small negative impact.

The remaining once-through cooling intake measures are well within this exclusion boundary and similarly immune to land use alteration issues.

Marine Ecological Resources

Deepwater intake, offshore wedge wire, offshore intake relocation, and substrate filtering systems construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the velocity cap system, wedge wire modules, substrate piping using the tunnel boring machine will reduce marine habitat losses and water quality impacts to localized areas around these intake features—a moderate negative impact. These systems will also have onshore and/or nearshore components that will also result in localized turbidity impacts and some temporary and permanent loss of nearshore habitat areas. The inshore fine screen will also pose similar construction impacts to nearshore areas. Collectively, these construction impacts can be characterized as a moderate negative impact. While deepwater intake, wedge wire screen, and offshore intake relocation should offer the ability to reduce the impingement and entrainment impacts associated with the DCPP once-through systems (assuming the deeper intake area is less biologically productive) local studies (see Section 4.2) indicate there is little evidence of this common attribute. The existing once-through system already results in the lowest impingement biomass rate (weight/gallons of water withdrawn) of all coastal power plants (Tenera, 2011). This is due primarily to its relatively confined engineering cove and exposed rocky coast, which create a localized environment where the local fish and shellfish population adapted to strong coastal currents and variable ocean surges making them somewhat resistant to the flow dynamics of cooling water intake systems. These once-through cooling offshore intake systems will not, by themselves, reduce the overall water withdrawal or water discharge rates. The thermal discharge impacts to aquatic life will remain largely unchanged. Consequently, some of these offshore systems (deepwater intake and offshore relocation) will, operationally, offer little or no impact relative to the current condition.

The substrate filtering system and wedge wire system offers the ability to reduce intake velocities and filter the influent water through the seabed, and will likely satisfy the performance requirements of the *California Once-Through Cooling Policy*. Consequently, this substrate and wedge wire systems will, operationally, offer a large positive and moderate positive impacts, respectively, relative to the current condition.

The inshore fine mesh screen system could reduce entrainment impacts by virtue of the improved filtering action, as opposed to any change in water withdrawal rates. Consequently, this system will operationally offer a moderate positive impact relative to the current condition.

Construction activities associated with the variable speed cooling water are confined to the previously developed land areas. The operational strategies system will be implemented in previously disturbed land and nearshore areas. There will be little or no construction impacts to marine areas from these options.

During periods of reduced power output, the variable cooling water pump system will, in response to lower loads, withdraw less ocean water resulting in a parallel/equivalent reduction of impingement- and entrainment-related marine life losses and a coincident reduction of local thermal impacts from the reduced cooling water discharge. This positive benefit is characterized as small because it is only realized during those limited periods when the facility is operating at a fraction of its full baseload condition.

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 deepwater intake, offshore wedge wire, offshore intake relocation, and inshore fine screen system offer significant nearshore or onshore impacts. The substrate, variable cooling pump system, and operational strategies offer lesser nearshore and onshore impacts. These impact areas have been largely previously disturbed and therefore do not offer a viable terrestrial natural habitat area. Consequently, there will be little or no construction impacts to terrestrial natural habitat areas or areas with significant ecological value or sensitivity from any of the once-through cooling intake system options.

Operation of all of the once-through cooling intake systems will present no new threat to these terrestrial resource areas.

Cultural and Paleontological Resources

Because installation of the various once-through cooling intake systems will impact previously disturbed onshore and nearshore areas, there is little or no potential to discover new cultural resources in these areas. Discovery of paleontological resources in these onshore and nearshore disturbed areas is also unlikely. Some portions of submerged lands subject to impact from the offshore intake systems may have been exposed during periods where the sea level was some 150 feet lower than it is today, and so there is some potential for impacts in these areas. The potential for offshore submerged paleontological resources has not been the subject of a previous study. Given the disturbed nature of the nearshore and onshore areas and the relative scarcity of definitive or related evidence of resources resident in offshore submerged lands, the construction impacts to cultural resources can be characterized as a small negative impact.

Operationally, there will be no additional impacts to cultural or paleontological resources from the deepwater system.

Visual Resources

All 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 once-through cooling systems will be submerged and, in some cases, will offer a new low-profile structure in a view shed largely dominated by the existing industrial structures. Consequently, the once-through cooling options will present no permanent significant change in external profile of the facility.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during the associated plant outage. While the associated construction period means that related traffic impacts will not be transitory, the necessary workforce is not expected to be large. Consequently, the transportation-related construction impacts should be considered a small negative impact.

Operationally, the deepwater intake system has the ability to extend beyond the 1 mile exclusion zone. Should this system extend beyond 1 mile, the associated increased maintenance and service requirements for the offshore velocity cap could impact water borne traffic. This maintenance increase could also be associated with the offshore intake relocation, wedge wire, inshore fine screen mesh, and substrate system. Any related maintenance staff increases are expected to be minimal. Therefore, there are limited or no operational transportation impacts for the once-through cooling systems.

Socioeconomic Issues

While there will be some additional construction-related employment opportunities with installation of these once-through cooling systems, these opportunities are not expected to significantly strain local community resources (that is, housing, schools, fire/police services, water/sewer).

Operational maintenance staff levels may increase slightly, but will not result in any related community service or resource concerns.

4.4 First-of-a-Kind

4.4.1 Closed-Cycle Cooling Systems

All the five closed-cycle cooling systems are not first-of-a-kind technologies. All technologies have reference towers of comparable sizes that have been built and in operation for several years in the power industry, and some at nuclear sites. The DCPP site is not subject to weather extremes (extreme heat or cold) and, thus, the conditions the technologies would be subject to do not present any kind of first-of-a-kind risk. Detailed seismic analysis of each manufacturer's technology design was not performed as part of Phase 1, but most of the technologies have been installed in areas of high-seismic activity and, thus, it is assumed that no first-of-a-kind fatal flaw is present with respect to seismic design. This is also described in more detail in Section 4.6.

There are an extensive number of references available for each technology, but there are only a couple given below because it is felt they are some of the more relevant references because they are of comparable size (total MW cooling required) or application as to what is required for DCPP. Based on the operating history and reference projects for each technology, it is reasonable to assume that each is scalable to meet the site requirements and there are no nuclear-specific design requirements that would preclude any of their use.

Passive Draft Dry Cooling Towers

1. Kendal coal-fired power plant, 6 x 686 MWe, South Africa
2. Qinling coal-fired power plant, 2 x 660 MW, China
3. Zuoquan coal-fired power plant, 2 x 660 MW, China
4. Yangcheng thermal power plant, 2 x 600 MWe, China
5. Razdan PS, 2 x 310 MWe & 4 x 200 MWe, Armenia
6. Gebze & Adapazari combined cycle power plant, 3 x 800 MWe, Turkey

Mechanical (Forced) Draft Dry Cooling Towers

Note that the following reference list is applicable for mechanical draft air-cooled heat exchangers, which represent the mechanical (forced) draft dry/air cooling technology considered in this study. Mechanical draft air-cooled condensers are not included in the list below.

1. Bilibino nuclear power plant, 4 x 12 MWe, Russia (only known dry-cooled nuclear power plant in the world)
2. Mondugno combined cycle power plant, 800 MWe, Italy
3. Kaneka co-gen, 60 MWe, Japan (located at sea shore)

Wet Natural Draft Cooling Towers:

1. Beaver Valley Nuclear Station Unit 2, 846 MWe, USA-Pennsylvania
2. Grand Gulf Nuclear Station, Unit 1, 1297 MWe, USA- Mississippi
3. Watts Bar Nuclear Power Plant, Unit 1, 1123 MWe, USA-Tennessee
4. Rancho Seco Nuclear Generating Station, USA-California (has been decommissioned)

Wet Mechanical (Forced) Draft Cooling Towers (Circular):

1. Palo Verde Nuclear Generating Station, > 4,000 MWe, USA-Arizona
2. Great River Energy Coal Creek Station, 1,100 MWe, USA-North Dakota
3. Chinon B Nuclear Power Plant, 4 x 905 MWe, France
4. Columbia Generating Station nuclear, 1190 MWe, USA – Washington
5. River Bend Station nuclear Unit 1, 989 MWe, USA – Louisiana

Hybrid Wet/Dry Cooling Towers (Circular)

1. Neckarwestheim Nuclear Power Station (GKN 2), 1400 MWe, Germany
2. Sarlux integrated gasification combined cycle, 548 MWe, Italy

4.4.2 Deepwater Offshore Intake

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

4.4.3 Initial Intake Relocation

The velocity cap intake technology is a proven and feasible concept that is commercially available and one that can support the significant water withdrawal rates associated with once-through cooling system operation. The velocity cap concept is being successfully operated at SONGS.

The offshore velocity cap technology is widely used for intakes requiring large water withdrawal. The largest once-through cooling intake with comparable water usage is SONGS, which also withdraws water from a similar Pacific Ocean environment.

The enhancement relative to the current SONGS design is the installation of multiple velocity caps to reduce the inlet flow velocity to 0.5 fps, providing enhanced protection for aquatic life. In addition, fish collection and return system will be added to all traveling water screens to further reduce the impingement mortality, with collected fish returned back to the ocean via the return line.

4.4.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

This technology is commercially available and can support the large amounts of water withdrawal rates associated with once-through cooling systems with appropriate maintenance provisions. Fine mesh screens have been installed and are operating at Big Bend (0.5-millimeter mesh), Brayton Point Generating Station (1-millimeter mesh), and Salem Generating Station (1.6 millimeters x 12.7 millimeters). Due to the limitations, available space, and the associated number of screens that can fit this space, the 0.5-millimeter mesh size is unworkable. The 1- to 2-millimeter mesh openings are considered to be the more reliable option.

The detailed evaluation is as follows:

- This technology, as modified, does not constitute a first-of-kind in scale.
- The environmental attributes of fine mesh screens have been extensively studied, and they are operating in large power stations such as Big Bend and Brayton Point.
- The fish collection and return system typically includes two pressure sprays. The low-pressure spray gently moves egg, larvae, and fish off of the screen face and fish bucket (Tetra Tech, 2002) (Tenera, 2000), and then the follow-on high-pressure spray dislodges the remaining debris clinging to the screen mesh.
- The dual flow screen technology is seeing increased use in the United States and worldwide. This system eliminates the debris carryover and boasts a higher screen surface area than comparable flow-through screens.
- Fine mesh screens will result in significant increases in debris loading on screen panels. In addition to increasing screen surface area, dual flow screens will use a variable frequency driver to generate continuous screen rotation at speeds up to 40 feet per minute. This is routinely done in the industry to counter the high-debris loading conditions.

4.4.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

This technology is commercially available and it can support the large amounts of water withdrawal requirements of a once-through cooling system.

The wedge wire technology is widely used for cooling tower makeup water systems with small flows, but there is less experience for intakes requiring large water withdrawals.

The largest once-through cooling intake with comparable water withdrawal rates is Elm Road Generating Station in Wisconsin, which withdraws 1.56 million gpm of freshwater from Lake Michigan. The screen slot size for screens in this intake is 9 millimeters, which reduces the clogging potential.

No wedge wire screen intake system has been identified for a marine application with water withdrawal rates associated with DCPP.

To counter the biofouling, screen material for marine application will likely include the use of copper-nickel alloy.

4.4.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.4.7 Source Water Substrate Filtering/Collection Systems

Use of the source water substrate filtering collection system to supply water to a once-through system is a first-of-a-kind application of this technology. Previous applications of this technology have been used to supply makeup water to closed-cycle cooling systems, which demand a fraction of the amount of water required for once-through cooling. Review of available information regarding the substrate filtering collection system suggests that this technology can be scalable in theory for the once-through cooling water demand but is not practical due to the required size of the field necessary to support the flow requirements of DCPP and the fact that efficiency of this system is very difficult to maintain. As noted below, if the efficiency cannot be maintained, the size of the field must be dramatically increased. Selection of the type of substrate system (natural or artificial filter) depends on the geologic setting of the offshore environment, the seafloor materials present in the area designated for the installation of the substrate filtering collection system, and the site-specific hydraulic conductivity test measurements of the substrate material. For these reasons, it has been determined that this technology should not be used for this application.

4.4.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate this technology because it has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

4.5 Operability General Site Conditions

4.5.1 Closed-Cycle Cooling Systems

The current source of cooling water for DCPP is the Pacific Ocean. The Pacific Ocean is the most reliable source of cooling water at DCPP, ensuring an uninterrupted supply for the cooling requirements of an operating plant as well as the nuclear safety-related systems. Conceptual designs were developed for five closed-cycle cooling systems to minimize any negative impacts to current plant configuration, operation, and output as much as possible. The design bases were developed from site climatic conditions and enveloping thermal criteria that would mimic once-through cooling operation as closely as possible, by considering the lowest realistic cold water temperature achievable with a specific technology with high ambient temperatures.

This study performed for the evaluation of closed-cycle cooling water system is based on the existing cooling requirements for circulating water system for DCPP Units 1 and 2. The circulating water system is currently designed to condense exhaust steam from the low-pressure turbines and to dissipate heat loads associated with the service cooling water heat exchangers, condensate cooler, intake cooling water heat exchangers, and the chlorination system. Documents providing technical information obtained from PG&E were largely used to develop the basis for the closed-cycle cooling tower design. Where possible, the questionable values and/or clarifications were verified and/or confirmed by PG&E.

Although most of the current seawater entering the intake structure is pumped through the main condenser via a circulating water system, a small portion of the intake seawater flows in to the auxiliary saltwater system. The auxiliary saltwater system supplies cooling water for the nuclear safety-related component cooling water system. Each unit at DCPP has two redundant auxiliary saltwater system trains and each train is capable of providing adequate cooling flow to the component cooling water system heat exchangers to ensure safe shutdown of a unit under normal and accident conditions. Due to the safety-related requirements of the auxiliary saltwater system, the conceptual design of the closed-cycle cooling system for DCPP will not include modifying the existing auxiliary saltwater system and the closed-cycle cooling system described in this study, and will not include safety-related equipment. In the event of a failure in the closed-cycle cooling system, the plant will be able to achieve the safe shutdown under its current safety design features.

The design heat duty and circulating water flows for the conversion of the DCPP Units 1 and 2 once-through system are summarized as follows:

Design Heat Load and Flow Rates - DCPP Units 1 and 2

		Current Once-Through Cooling System	Closed-Cycle Cooling System	Source of Information
Main Condenser, each unit	MMBtu/hr	7898	7898	DCPP Main Steam Condenser Data & Description (LCM Report 2003 Rev 0, dated July 16, 2003) shows heat duty of 7,600 MMBtu/hr. The estimated heat duty using Alstom heat balance 75V1754-28 and 75V1754-31 for Unit 1 and Unit 2 respectively is 7773 MMBtu/hr and 7898 MMBtu/hr respectively. Using the worst case heat duty of 7898 MMBtu/hr.
Service Cooling Water Heat Exchangers, each unit	MMBtu/hr	19	19	Service Water Heat Exchanger Data Sheet dated 8/23/68 by Thermxchangers, Inc.
Intake Coolers, each unit	MMBtu/hr	4.0	4.0	Per notes on the Xcel spreadsheet – Plant Thermal Heat Duty estimation - developed by Bechtel and confirmed by DCPP
Condensate Coolers, each unit	MMBtu/hr	25	25	Per telephone discussion with Joseph Anastasio of DCPP
Auxiliary Saltwater System component cooling water system Heat Exchanger, each unit	MMBtu/hr	325	0	Auxiliary Saltwater System Training Guide dated 05/27/09, Title E-5, Rev. 14
Total Heat Load, each unit	MMBtu/hr	8,271	7946**	
Temperature Rise in Main Condenser, each unit	F	18	18	
Circulation Water Flow, each unit	gpm	878,000	882,889	

** Heat duty does not include auxiliary saltwater system cooling duty, because this safety-related system will not be serviced by the closed-cycle cooling towers.

Site Ambient Conditions

DCPP is located approximately 8 miles north-northwest of Avila Beach in San Luis Obispo County. The design ambient temperatures (dry and wet bulb) used for the development of overall cooling tower design are based on the 0.4 percent exceedance temperatures as obtained from engineering weather data for Santa Barbara (closest to DCPP).

Design dry bulb temperature:	83ºF
Design wet bulb temperature:	68ºF
Plume free design point (dry bulb/relative humidity, RH):	33ºF /90% RH

Engineering Weather Data is a compilation of 30 years of data and the design basis for performance provided above is considered conservative. These temperatures are for thermal performance design and are not the same as the maximum temperatures that the equipment could withstand. All of the tower components and mechanical equipment can be designed to withstand and perform at the site extreme maximum and minimum temperatures identified in plant licensing documents, but the thermal performance will be worse than described in the study. It is reasonable to assume that the plant could de-rate for a small period of time during extreme cases, and it is not necessary to design the towers to perform at these conditions because they are rare.

Plant Performance

The size of a closed-cycle cooling system is primarily based on the thermal load rejected to the cooling tower and approach to ambient dry or wet bulb temperatures. A closer approach will result in the larger tower producing colder water temperature assuming design cooling range and terminal temperature difference remain unchanged.

Due to physical area constraints at the DCPP site, the conceptual design of closed-cycle cooling towers is focused on limiting the physical size of the tower while maximizing the thermal performance. The vendors have designed the passive draft dry/air cooling and mechanical (forced) draft dry/air cooling towers based on the approach of 20°F to design dry bulb temperature, while for wet natural draft cooling and wet mechanical (forced) draft cooling including hybrid wet/dry cooling towers with approach of 12°F and 9°F, respectively, to wet bulb temperature. These approaches were developed based on iterative investigations with closed-cycle cooling technology suppliers. The cooling towers with these approach temperatures result in cold water temperatures exceeding the existing design maximum allowable temperatures for some of the closed cooling water system components. This may impact the design and operation of closed cooling water system components and will be evaluated in detail during Phase 2.

The estimated condenser pressure, steam turbine gross output change, and parasitic loads are developed using Alstom's Steam Turbine Balance (HTGD040131) dated September 16, 2003 and are summarized for closed-cycle cooling system technologies in the following table:

Operational Impacts Per Unit

Design	Current Once-Through	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Hybrid Wet/Dry Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling
Cooling water inlet temperature to tower, °F		121	121	95	98	95
Cooling water outlet temperature from tower, °F		103	103	77	80	77

Design	Current Once-Through	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Hybrid Wet/Dry Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling
Condenser cleanliness factor, %	85	85	85	85	85	85
Condenser pressure, in HgA	1.71 (Note 1)	5.3	5.3	2.7	2.9	2.7
Steam turbine output change, % (Note 2)	Base	-10.5	-10.5	-3.7	-4.4	-3.7
Steam turbine output change, MW (Note 2)	Base	-125.5	-125.5	-44.4	-52.3	-44.4
Tower fans auxiliary load, MW		0	39.3	23.8	0	14.4
Circulating water pumps auxiliary load change (Note 3), MW	Base	7.6	7.6	2.6	2.6	2.6

Notes:

1. Base steam turbine backpressure from Alstom heat balance 75V1754-29, "Unit 1: Maximum Guaranteed – Post LP Retrofit"
2. The base steam turbine output: 1,191,521 kWe
3. Additional circulating water pump load changes represent the difference between the new circulating water pumps for the closed-cycle cooling towers and existing circulating water pumps for once-through cooling system. It does not reflect any auxiliary load changes to other circulating water systems and/or closed component cooling systems

* * *

The turbine output changes provided above will vary with ambient conditions. Based on engineering weather data, high ambient conditions were selected for the analysis because the highest temperatures for the site would result in the worst performance from the cooling equipment and, thus, the Operational Impact Per Unit table above is an approximation of the highest impacts to current plant operation, as well as the greatest output delta in between the technologies. The analysis was also done this way to ensure that the turbine could operate under all ambient conditions for each technology.

The quantitative effects of wind on each technology were not considered in this study, but it is important to note that wind can cause substantial performance degradation for the mechanical draft technologies by impacting fan performance. Site-specific wind analysis can be performed as part of Phase 2.

Low-Pressure Turbine Exhaust Pressure

The condenser pressure will be relatively higher than the existing once-through cooling system due to cold water temperature being higher than once-through cooling water temperature. The condenser pressure is expected to be in the range of approximately 5.3 inches HgA for the dry/air (passive draft dry/air cooling and mechanical [forced] draft dry/air cooling) closed-cycle cooling systems, while it is approximately 2.7 to 2.9 inches HgA for wet (hybrid wet/dry cooling, wet natural draft cooling, and wet mechanical [forced] draft cooling) closed-cycle cooling systems at the ambient design dry bulb/wet bulb temperature. These condenser pressures are significantly below the turbine alarm point of 9.0 inch HgA (Alstom, 2003)

Reduction in Power Generation

Due to the higher cold water temperatures associated with each closed-cycle cooling technology compared to the existing once-through cooling system, the power produced by the plant will be less. The reduction in steam turbine generator output is expected to be approximately 10.5 percent for the dry/air (passive draft dry/air cooling and mechanical [forced] draft dry/air cooling) cooling systems and in the range of 3.7 to 4.4 percent for wet (hybrid wet/dry cooling, wet natural draft cooling, and wet mechanical [forced] draft cooling) cooling systems. The differences in output are due to the face that each technology achieves a different cold water temperature at the design ambient conditions and the auxiliary power requirements are also different for each.

Potential Modifications to Main Condenser and Other Cooling Components

The physical sizing of closed-cycle cooling towers obtained from vendors is based on the existing thermal loads on the main condenser and other associated cooling components. The systems will be designed to supply circulating water with flows, pressures, and temperatures as close as possible to existing conditions at DCPP. However, since the tower design is normally based on the approach temperatures to ambient conditions, the achievable design cold water temperatures will be higher compared to existing conditions. Associated cooling components may therefore require modifications due to exceeding maximum allowable cold water temperature. Some modifications to the main condenser may be required with the cooling towers due to increased circulating water pressure resulting from increased total circulating water pumps head to raise water to the riser elevation of the towers. Also, as a result, changes to the operation of pumps, valves, and other cooling components may occur. These system evaluations will be performed in Phase 2.

Availability of Freshwater Sources

The water for use in the closed-cycle cooling systems could normally be supplied by seawater from the current intake structure from the Pacific Ocean (dry cooling only or would need to be desalinated for the wet cooling technologies due to PM-10 emissions as described earlier), or by fresh or reclaimed water from groundwater or nearby water treatment facilities.

A study by Nuclear Regulatory Services and Technical and Ecological Services (1993) indicates that an approximate freshwater supply of 300 gpm is available in the Diablo Creek alluvium. However, the Diablo Canyon License Renewal Application ER states: *A refurbished Ranney well system, or any other system capable of drawing from Diablo Creek surface waters, will not be installed or used in the future in accordance with the provisions of the coastal development permit for the Replacement Steam Generator Projects conducted during the current licensed period.* This is interpreted to indicate that this freshwater source is precluded. The deep supply well on the site has a maximum capacity of 170 gpm. Multiple wells could be used to increase this supply, however, with well spacing requirements and property limitations, it is probable that not more than 10 wells could be placed within the site footprint, for a total of 1700 gpm.

Additional fresh or reclaimed water would come from water treatment facilities within 20 miles of the site and these include the San Luis Obispo Wastewater Treatment Plant and the Morro Bay/Cayucos Wastewater Treatment Plant. Based on preliminary discussions with municipality representatives, there may be a total of up to 7.6 million gallons per day available. Quantities available from each will be confirmed during Phase 2. Conceptual development of the pipelines and pumping stations required to deliver this water from the sources to the plant site will be included in the Phase 2 analysis.

In the event of a water supply shortfall, the Nuclear Review Committee has directed that desalination be pursued. This will be more thoroughly developed in Phase 2 of the study.

4.5.2 Deepwater Offshore Intake

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

4.5.3 Initial Intake Relocation

The velocity cap technology can be integrated into the existing open channel system with the addition of modifications mainly at an offshore location, as shown on Figures IR-1 and IR-2. While there are no changes to the onshore pump intake structure, there will be additional head loss in the intake system. These potential impacts are evaluated in the following section.

This technology has been reviewed from an operation point of view and the findings are presented below:

- The offshore velocity cap/intake tunnel design will be sized to ensure a low pressure drop across the system. To minimize the added offshore component head loss as compared to the existing shoreline intake system, the focus of the design is to lower the pressure drop by employing multiple velocity caps and large diameter tunnel.

- The added head loss could adversely affect the operation of the existing circulating water pumps due to reduced submergence and net positive suction head availability, but our review of the pump characteristics has demonstrated that the pumps should be able to function acceptably to supply the cooling requirements of the plants.

- The total head loss increase is not expected to be more than 4 to 5 feet over the existing shoreline intake. A physical pump intake model testing will be necessary to evaluate the effect of 4 to 5 feet lower submergence on the vortex formation and to find solutions to eliminate undesirable vortices if necessary.

- The lower water level will also result in reduced net positive suction head availability to the pumps, which may limit the allowable pump operation.

- Due to the reduction in pump head caused by additional pressure drop, the circulating water pumps will deliver slightly less flow (current pump rated head is 96.5 feet). This flow reduction may result in a slight load reduction.

4.5.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

The new inshore fine screen technology can be integrated into the existing system with modifications inside the existing intake structure or along the west side of the cove, as shown on Figures IFMS-1 through IFMS-2. The conversion of the existing flow-through screen to the dual flow type will increase the screen surface area that further ensures operability of the intake after the conversion. Also, since the new dual-flow screens replace the existing flow-through screens for the cooling water pumps, there will be little increase in head loss and so a negligible reduction of cooling water pump flow is expected. The new screen modification will not adversely affect the screens serving the safety-related auxiliary saltwater pumps.

The detailed evaluation is shown as follows:

- The head loss through the new dual-flow screens will be small, but may be slightly higher (by approximately 0.1 to 0.2 feet) than the existing through-screens. This is primarily due to the screen assembly exit loss, which is attributed to its unique orientation with approaching flows. These flows enter the screen mesh parallel to the incoming flow direction and exit through the center opening. Collectively, with the screen having the larger screen surface areas and with them continuously rotating, the chance of increased head loss through the screen due to blockage by fine mesh panels is reduced, and the overall small head loss increase will have a negligible impact to the existing cooling water pump operation.

- The fish collection and return system that will be associated with each new dual-flow screen will operate continuously and encourage collected fish, egg/larvae to be washed off of the screen via the low-pressure jets and returned to the sea west of the breakwater via the fish return pipe. To ensure appropriate minimum flow depth inside the fish return line, flush water will be made continuously available.

- Continuous running of the dual-flow screen at higher speeds may increase the maintenance and other necessary service to these screens, when compared to the existing intermittently operated screens.

- The screen modification will not affect the existing flow-through screens for the auxiliary saltwater pumps, since they are located in a separate facility.

4.5.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The wedge wire screen technology can be integrated into the existing system with modifications occurring mainly at offshore location, as shown on Figures WW-A-1 through WW-A-3 and Figures WW-B-1 through WW-B-3. There would be limited changes to the onshore pump intake structure equipment, but there will be additional head loss to the offshore pipe or tunnel and its potential impacts are evaluated in the following section.

This technology has been reviewed from an operation point of view and the findings are presented below:

- The offshore screen/piping design will be based on low-pressure drop across the wedge wire screen's intake system and large piping or tunnel diameter to minimize the added offshore component head loss, as compared to the existing shoreline intake system. The added head loss could adversely affect the operation of the existing circulating water pumps due to reduced submergence and net positive suction head available. However, the total head loss increase is not expected to be more than 4 to 5 feet relative to the existing shoreline intake. A physical pump intake model testing may be required to evaluate if the 4 to 5 feet lower submergence would result in unacceptable surface vortex and determine the associated mitigation measures via laboratory testing. Lower water level will also result in reduced net positive suction head available to the pumps that may limit the allowable pump runout during one pump operation. It may be necessary to throttle the cooling water pump discharge valve, or add a new throttling valve, to limit the runout flow rate. Finally, by using a several feet low pump pit level, the cooling water pump may deliver slightly less flow for a pump with a rated head of 96.5 feet. This flow reduction may result in a slight reduction of load.

- Due to location, distance, and size of the offshore wedge wire screens, the air backwash cleaning system for these screens is not practical. Consequently, the selection of a proper size for these screens and appropriate orientation will promote effective cleaning by the ocean currents, which is a key component of the successful screen operation.

- Wedge wire screens with smaller size openings than recommended will be susceptible to clogging, which can reduce or even stop the withdrawal of water. The screen slot size has been selected such that there is a balance between the reduction in impingement/entrainment and the required additional maintenance impacts.

- The smaller the slot size, the higher the frequency of clogging and the greater the number of screens and associated maintenance.

- Complete stoppage of flow may result in vacuum conditions inside the screen, which can damage the screen that is a design perimeter that must be considered as part of the screen design.

- Frequent inspection and cleaning of screens using hydraulic jets from service vessels assisted by divers is an essential activity for the offshore screens. The frequency of inspection and diver-assisted cleaning is directly proportional to the seasonal marine growth and debris condition at the screen.

- Emergence openings may need to be incorporated into the breakwater extension to ensure a continual water supply to the auxiliary saltwater pumps to maintain their safety function.

4.5.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.5.7 Source Water Substrate Filtering/Collection Systems

In theory, the source water substrate filtering collection system technology can be integrated into the existing system by modifying the onshore pump intake structure (the existing open pump forebay will be replaced by a new pump forebay, formed by enclosing the intake cove). The new pump intake forebay would be located at the confluence of the manifold lines. However, over time, the efficiency of horizontal laterals will only go down due to laterals getting clogged, vegetation growth over the substrate field, and marine growth inside the laterals and manifolds. These adverse conditions generate great uncertainty to the large scale substrate intake system, which renders it a fatal flaw.

- The source water substrate filtering collection system components can come with corrosion resistance to the marine environment.

- The imported materials used in the system—artificial filter, crushed stone, and armor rock—will be free of deleterious material and essentially nonreactive in the marine environment.

- Periodic bottom surveys will be needed to assess substrate conditions. Significant buildup of vegetation or fine materials (silts or clays) on the bottom could interfere with the efficient operation of the system, that is, clogging of laterals.

- Frequent inspection and cleaning of laterals, using hydraulic jets or mechanical brushes, can in theory maintain optimum water production. However, due to the large field of laterals/manifold networks, this maintenance cleaning of laterals with hydraulic jet and brushes will be not practical.

- Limitation of a laterals inspection, maintenance, and cleaning program needs to be determined.

- System must be overdesigned to account for lateral plugging where rehabilitation results in less than 100 percent of the initial flow conditions. The unknown is on the determination of what over design margin will be. If the laterals are designed with 50 percent and 25 percent efficiency, the number of laterals required and substrate area impacted will be two and four times larger.

In summary, despite manual cleaning of a vast number of laterals is possible in theory, it is not practical for a once-through cooling system application such as DCPP. All the envelop design parameters given in Section 3.8 are based on a 100 percent efficiency, which cannot be maintained following a plant operation. Exactly how much design margin is needed to maintain a given design efficiency cannot be known nor accurately predicted. This will result in a generally less reliable intake system, as compared to other traditional intake systems. Therefore, from an operation point of view, this technology is considered a fatal flaw when it is applied to a once-through cooling system such as DCPP.

4.5.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate this technology because it has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

4.6 Seismic and Tsunami Issues

4.6.1 Closed-Cycle Cooling Systems

The DCPP site is located on a south facing section of the open California coast. A breakwater was erected with the original construction of the plant because there was neither a bay nor offshore islands to provide wave protection.

Design basis high water levels are the result of postulated wave runup caused by a tsunami coincident with a high ambient tide and short period storm waves. The breakwater affords a level of protection against such an occurrence. It is required in accordance with the plant’s technical specifications to be maintained for protection of the safety-related auxiliary saltwater system pumps in the intake structure that supply the plant’s emergency cooling water.

For distant generators (subterranean earthquakes, submarine landslides, etc.), the estimated maximum tsunami wave runup is approximately 16 feet. Distant sources relative to the site are in the Aleutian area, the Kuril-Kanichatka region, and along the South American coast.

For local tsunami generators (the Santa Lucia Bank Fault, approximately 29 miles offshore of the site, and the Santa Maria or Hosgri Fault, approximately 3.5 miles offshore of the site), the estimated maximum runup at the intake structure is approximately 29.4 feet. This includes the effect of some slumping of the breakwater due to the initiating seismic event. The design basis flood level is 30 feet.

All of the closed-cycle technology applications being considered for DCPP would be constructed in an area of the plant that is well above the maximum tsunami wave height and the design basis flood level.

The cooling towers are to be located at higher elevations and further from the shoreline (relative to the plant's existing safety-related structures), so the tsunami protection of the cooling towers will be superior to that of the rest of the plant. It is possible that additional tsunami protection will be mandated by the NRC as a beyond-design-basis concern for the entire plant at a later time in view of post-Fukushima concerns. However, this is outside of the scope of the current evaluation.

For seismic requirements, the current California Building Code invokes ASCE Standard 7-05. It is likely that by 2015, the next version, ASCE 7-10, will be invoked in the new California Building Code. In either case, Table 15.4-2 of ASCE 7 places no height limit on cooling towers. As such, seismic/structural design will be feasible strictly from a code compliance standpoint for steel/concrete cooling towers of any height.

Seismic and Wind Load Considerations

Passive draft dry/air cooling towers and the wet natural draft cooling towers will be quite tall at approximately 600 feet, and will require the shell to be discontinued at the base to allow air passage, using braced legs at supports. Failure of any of the bracing members can lead to shell buckling and/or general loss of gravity load-carrying capability. Also, there is a potential for significant change in lateral stiffness and strength at the base because of the change from shell to braces. The subject applications are in areas of high-seismic requirements, so these considerations will result in passive draft dry/air cooling and wet natural draft cooling structural elements and connections that are quite robust and difficult to detail (in terms of seismic detailing requirements).

Wind loads can be significant, and are a governing design consideration for tall towers. The wind load analysis can be further complicated because of *group effect,* which will be significant because of the relatively close spacing of the towers envisioned for DCPP. This will require wind tunnel testing and expert assessments to develop sound wind-resistant design.

Finally, because of their size and aesthetic impact (such tall towers are signature structures that dwarf everything around them), it is likely that they will receive intense scrutiny from building officials, peer reviewers, and interveners. All these factors will drive up the cost of design and construction for passive draft dry/air cooling and wet natural draft cooling options.

The hybrid wet/dry cooling towers have two levels of fan decks (lower deck for wet section and upper deck for dry section), resulting in an additional 50-foot height relative to the cooling tower associated with wet mechanical (forced) draft cooling. For both cases, it is assumed that the vertical heat exchangers on the outer perimeters will be supported off the latticed structural framing at the base of the cooling tower. The additional 50-foot height of the hybrid wet/dry cooling tower will result in higher seismic loads on the supporting structural elements.

At approximately 123 feet tall, the cooling towers for mechanical (forced) draft dry/air cooling have the lowest height profile, which is very desirable from a seismic/structural design standpoint. At approximately 125 feet tall, the wet mechanical (fixed) draft cooling towers will also be relatively short and desirable from a seismic/structural standpoint.

Summary

All cooling technologies are considered viable from a tsunami, seismic, and structural perspective. However, from an efficient design and construction perspective, the wet mechanical (forced) draft cooling is considered most attractive for DCPP (since there is no sufficient space at DCPP site for the mechanical [forced] draft dry/air cooling option). The hybrid wet/dry cooling tower option is also considered to be an efficient option, and warrants further consideration when making the final selection.

4.6.2 Deepwater Offshore Intake

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

4.6.3 Initial Intake Relocation

The design criteria will be similar to the existing structures and it can properly be designed against design seismic requirements and design wave forces.

The detailed evaluation leads to the following:

- The structural design will use the same seismic category as the existing category that was employed for the current shoreline intake. The tunnel will be constructed in a rocky substrata containing minimal fractures.
- This technology assumes a submerged installation and a location offshore. It will be designed to withstand design wave forces.

4.6.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

The design criteria will be similar to the existing structures using the current license basis. The system can properly be designed to withstand the design seismic requirements, and wave forces, as applicable.

The detailed evaluation is as follows:

- The dual-flow screen structural design and fish return piping will use the current licensing basis seismic category that was employed for the current shoreline intake.
- This technology is located within the protected intake cove, so there is no exposure to wave damage.
- The fish return piping back to the sea will be covered with rock armor for stability and protection against wave forces.

4.6.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The design criteria will be similar to that used to design the existing structures. The wedge wire system can properly be designed to meet the appropriate seismic requirements and wave forces.

The detailed evaluation leads to the following:

- The structural design will use the same seismic category as that which was used for the current shoreline intake.

- This technology, a submerged installation and located offshore, will be designed to withstand design wave forces.

In conclusion, there are no fatal flaws regarding seismic or tsunami issues.

4.6.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.6.7 Source Water Substrate Filtering/Collection Systems

Design criteria will be similar to that used for to design the existing structures. The system can properly be designed to accommodate the seismic requirements and design wave forces.

- The manifold piping will likely cross the Shoreline Fault Zone/N40W Fault (PG&E Company, 2011, Figure SWS-3).

- The structural design will use the same seismic category that was used for the current shoreline intake.

- The offshore substrate system will be designed to withstand design wave forces.

4.6.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate since this technology has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

4.7 Structural

4.7.1 Closed-Cycle Cooling Systems

Design criteria will be similar to the existing structures and any of the closed-cycle technologies can be properly designed against design seismic requirements and wave forces.

Structural aspects are addressed in the *Seismic and Tsunami Issues* section above, above because the evaluations of all of these criteria are related.

4.7.2 Deepwater Offshore Intake

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

4.7.3 Initial Intake Relocation

The offshore velocity cap system can be designed properly against all design loadings expected to be encountered in the open sea environment.

With proper engineering design method and identification of all critical loadings, it is not expected that the structural considerations of the offshore velocity cap intake system will be a limiting factor in its selection.

4.7.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

Most of the fine mesh screen system modifications will be located inside the existing pump intake. This system is not expected to result in any adverse impacts to the structural integrity of the existing pump intake. The screens will be designed to ensure there is no interaction with the screens that service the auxiliary saltwater pumps.

4.7.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The offshore wedge wire screen system can be designed properly to withstand all design loadings that may be encountered in the open sea environment. This design will consider full collapsing pressure to the outer screen that may be encountered during debris blockage.

With a proper engineering design method and identification of all critical loadings, it is not expected that the structural consideration of the wedge wire screen intake system will be a limiting factor in its selection.

4.7.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.7.7 Source Water Substrate Filtering/Collection Systems

The substrate filtering collection system can be designed properly to withstand critical loading, including full collapse pressure on the laterals and manifold piping.

The offshore substrate filtering collection system is an independent system delivering the cooling water to the enclosed shoreline intake cove via a large conduit. It does not interfere with the shoreline pump intake structural.

4.7.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate this technology because it has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

4.8 Construction

4.8.1 Closed-Cycle Cooling Systems

The closed cooling systems for DCPP are considered feasibly constructible based on current-day construction methods, practices, and knowledge. However, all of the systems will have their own challenging issues and degree of difficulty.

The construction work activities for all of the closed cooling systems are very similar for each technology, but will vary in quantities and schedule duration for accomplishing the tasks. The basic work activities are:

- Closed-cycle cooling system work activities
- Mobilize/temporary facilities/utilities and training
- Install temporary environmental controls
- Excavate and grade tower areas
- Excavate pump house/water treatment areas
- Excavate underground piping, ducts, and electrical bank areas
- Install piling/foundations/slabs/basins (towers/pump houses/electrical building)
- Install underground ducts/electrical duct bank and underground piping/valves
- Install structures (towers/pump houses/electrical buildings)
- Install aboveground piping, valves, hangers and supports
- Install electrical equipment (motor control centers/switchgear/transformers)
- Install aboveground conduit and cable tray
- Install power and control cable/terminations
- Install lighting, aviation lighting/lightening protection
- Control room modifications
- Startup testing
- Replace system tie-ins and decommission modifications to existing systems and equipment that would no longer be used.
- Commissioning
- Clean up and demobilization

All of the closed cooling systems for DCPP will require massive excavation cut-and-fill operations of the mountain area north of the site. The excavation plan will include leveling the mountain peaks that range from over 450 feet to over 650 feet in elevation down to a level grade of approximately 115 feet above mean sea level to create a level foundation for each of the towers. It is favorable to construct all of the towers at the same elevation to avoid any unusual air patterns that may occur if there are hills and valleys close to the towers, or if intakes and discharges of neighboring towers are located at different heights. Air swirls may negatively impact tower performance in various ways including starving the air inlets, disrupting design airside static pressure through the towers, or inducing recirculation. The high shear wave velocity of the mountain material would exceed dozer rip ability production, and would require considerable controlled blast demolition excavation to raze the mountain areas to locate the cooling towers and pump houses. Benched excavations may be used to locate the towers on varying elevations to minimize the total quantity of excavated material. A positive aspect of the site being on rock is that tunnel boring machines may be used for the installation if the circulating water ducts.

Use of passive draft dry technology will require three towers per unit for a total of six towers, and at least three of them would be required to be located to the north or west, outside the Owner-controlled area. The excavation quantity and construction times will be developed during Phase 2 of this study, but based on a review preliminary estimate, these towers would require excavation of over 48 million cubic yards of rock and the excavation activities would take approximately 5.5 years to complete. Complete construction of the passive draft dry/air cooling towers is estimated to take over 8 years using a peak workforce of 615.

Mechanical forced draft dry will require one tower per unit for a total of two towers, one of which will not fit on the current Owner-controlled site area. One of the two towers would be required to be located to the north, outside the Owner-controlled area. The excavation quantity and construction times will be developed during Phase 2 of this study, but based on a review, the preliminary estimate is that these towers would require excavation of over 48 million cubic yards of rock and the excavation activities would take approximately 5.5

years to complete. Complete construction of the mechanical (forced) draft dry/air cooling towers for both units is estimated to take over 8 years using a peak workforce of 615.

Both wet natural draft cooling and wet mechanical (forced) draft cooling towers as well as the hybrid wet/dry cooling technology will require two towers per unit for a total of four towers. The four-tower footprint will fit on the current Owner-controlled site area; however, these options are still subject to the excavation considerations given below due to the mountainous terrain of the Owner-controlled area where these towers could be located. The excavation quantity and construction times will be developed during Phase 2 of this study, but based on a review, the preliminary estimate is that these towers would require excavation of over 24 million cubic yards of rock and the excavation activities would take approximately 2.75 years to complete. Complete construction of any of the wet technologies for both units is estimated to take over 6.25 years using a peak workforce of 615.

4.8.2 Deepwater Offshore Intake

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

4.8.3 Initial Intake Relocation

The major construction activities for using this technology include:

- A nearshore main vertical shaft
- A second offshore access shaft, if required for tunnel work sequencing
- An underground tunnel below sea bottom
- An offshore vertical shafts without connection to the tunnel
- Construction of a precast velocity cap components onshore
- Installation and connection of precast velocity caps to vertical shafts and placement of backfill material and seabed riprap and armor protection
- Connection of offshore vertical shafts to underground tunnel
- Addition of fish collection and return features to all traveling water screens
- Installation of fish return piping from the pumphouse to the ocean away from the intake cove
- Construction and completion of breakwater enclosure

The velocity cap precast components will be built onshore, launched from the surface of a barge, and dropped to their design location. Upon completion of the velocity cap installation, the seabed will be leveled with graded crushed stone and protected with riprap and armor stone on the top layer for stability and scour protection purposes.

4.8.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

The major construction activities for using this technology include:

- Excavating trench and installing fish return piping.

- Installing fish return pipe armor protection against wave damage at its discharge point into the sea west of the breakwater.

- Installing stop logs for the two screen bays of the unit that houses six screens for the unit (with one of the two units shutdown). Subsequently, remove all the existing through flow traveling screens for circulating water pumps. Note that the auxiliary saltwater pumps and their corresponding traveling screens will operate continuously.

- Modifying the deck area as needed to accommodate the dual flow screen.

- Installing custom-fit single assembly dual-flow screens with fish buckets attached to each screen panel.

- Installing the fish return system.

- Installing a new screen drive.

- Repeat same steps for the other unit.

With the modifications planned for the intake structure, it is expected that at least one unit will be shut down when the screen retrofit is being installed for that unit. No major construction difficulty is expected, as dual-flow screen conversion will be custom-made to fit in the existing screen bay openings.

Before the screen retrofit, the fish return line needs to be installed and properly protected against wave damage.

4.8.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

4.8.5.1 Alternative A: Offshore Tunnel

The major construction activities for using this technology are all feasible and include:

- Constructing the shoreline main vertical shaft
- Constructing second access shaft, if required for tunnel work sequencing
- Constructing the underground tunnel below sea bottom
- Constructing the offshore vertical shafts without connection to the tunnel
- Constructing the wedge wire assemblies piping manifolds onshore
- Dredging the seabed for placement of wedge wire assembly manifolds
- Installing the wedge wire piping manifolds and placing backfill material and seabed riprap and armor protection
- Connecting the wedge wire manifolds to offshore vertical shafts
- Installing wedge wire screens on manifolds at the sea bottom from barge
- Connecting offshore vertical shafts to underground tunnel
- Constructing and completing breakwater enclosure

4.8.5.2 Alternative B: Offshore Buried Pipes

The major construction activities for using this technology are all feasible and include:

- Dredging/excavating the seabed for placement of wedge wire assembly manifolds.

- Installing the offshore wedge wire piping manifolds in 3 stages. Each stage consists of installing three pipes in one excavated trench and covering with backfill material, crushed stone, and armor stones. Offshore pipes will be sloped upward minimizing excavation requirements.
- Installing the discharge box at the outlet of pipes. Discharge box can be made of precast components.
- Installing the wedge wire screens on manifolds at the sea bottom.
- Constructing and completing breakwater enclosure.

The wedge wire screen pipe manifold assemblies will be built on shore, launched from the surface of a barge, and floated to their design location. The wedge wire assembly manifold will be buried with adequate cover. Before the installation of the wedge wire assembly manifold, the seabed will be dredged/excavated to approximately a 15- to 18-foot depth to bury the manifolds. Turbidity curtains may be required to minimize suspended solids from reaching the existing shoreline intake.

Upon completion of the manifold, the seabed will be leveled with graded crushed stone and protected with riprap and armor stone on the top layer for stability and scour protection.

4.8.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.8.7 Source Water Substrate Filtering/Collection Systems

The major construction activities for using this technology include:

- Dredging/excavating the seabed for placement of laterals and manifold lines.

- Employing horizontal drilling techniques with the natural filter system to minimize substrate disturbance.

- Installing laterals offshore. Installation consists of placing laterals in the excavated trench and covering with backfill material (either excavated substrate or artificial filter), crushed stone, and armor stone.

- Installing the pump intake forebay at the confluence of the manifold suction line.

- Substrate excavation may require specialized excavation equipment where hard rock layers are encountered.

- Turbidity curtains may be required to control suspended solids.

- Upon completion of the laterals and manifold, the seabed will be graded and covered by crushed stone and then protected with riprap and topped by armor stone for stability and scour protection

4.8.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate this technology because it has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

4.9 Maintenance

4.9.1 Closed-Cycle Cooling Systems

Compared to the existing once-through system, there are considerably greater operation and maintenance efforts associated with the use of any of the closed-cycle cooling technologies compared to the existing once-through shoreline intake. Major operations and maintenance concerns are mainly associated with the mechanical draft technologies and include ensuring proper lubrication and operational settings of associated mechanical components. Additionally, routine inspection activities are necessary to ensure that the materials remain in good condition. All of the technologies require maintenance and inspections to ensure the water distribution and heat transfer surfaces are in optimum condition and not clogged or dirty. The environmental impacts associated with the increase in activities were evaluated in Section 4.3 and a detailed list of the major actions that should be performed as part of a diligent maintenance program for each of the five technologies is included below. No fatal flaws are associated with any of these activities as long as proper personal protection equipment is considered, site operational safety procedures are closely followed (including lock-out, tag-out when required, etc.), and the cooling tower manufacturer is required to provide permanent access with appropriate barriers (such as ladders with locking spring-loaded gates to all levels requiring maintenance access) for the supplied technologies. While no fatal flaws are apparent, the scale of jobhours required for completing the activities will need to be considered and planned for and DCPP may need to hire additional personnel with the sole responsibility of ensuring the maintenance requirements are met for the selected technology.

There is additional equipment that could be purchased that can help to reduce jobhours required to perform gear-box lubrication oil change-out and reduce the volume of hazardous waste disposal of used oil. These include oil filtration systems and their purchase and use, which is at the discretion of DCPP personnel.

Table CC-18 reflects some of the major cooling tower maintenance activities, and it indicates to which technology the activity is applicable. Ultimately, the tower supplier will provide a recommended maintenance schedule for the technology provided. The following maintenance activities are typical of what is recommended during normal tower operation. Additional activities may be required during extended shutdown or other abnormal operational modes.

4.9.2 Deepwater Offshore Intake

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

4.9.3 Initial Intake Relocation

There are minimal operation and maintenance efforts associated with the use of offshore velocity cap intakes.

The velocity caps, vertical shafts, tunnel, and main shaft are subject to biofouling due to the inability of using an offshore chlorination system, which impacts the effectiveness of the intake tunnel conveyance. The biofouling growth thickness, however, reaches to an equilibrium depending on the type and velocity of the flow in the conduit and the conduit will be sized to account for the fouling.

Also, the design will consider standard methods used by the industry to support ways to remove seashells and other biofouling that will collect at the bottom of the main shaft.

4.9.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

There are considerably greater operation and maintenance requirements associated with the use of fine mesh dual-flow screens, as compared to the existing coarse mesh flow-through screens. The primary operation and maintenance concern is tied to the increased wear and tear on the now continuously rotating screens. This may lead to more frequent replacement of fine mesh panels, chain, and fish buckets.

4.9.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

There are considerably greater operation and maintenance efforts associated with the use of offshore wedge wire screens compared to the existing shoreline intake. The operation and maintenance major concern is in ensuring that marine biofouling can be controlled and screens can remain operational.

- While narrow slot wedge wire screens are effective at excluding marine life from entering the pipeline, they are susceptible to clogging from debris.
- Due to distance, size, and number of screens from the shoreline, the air backwash system is not practical and the screen design will need to consider this limitation.
- The slot size is 6 millimeters for this phase of the study. The final sizing will be subject to further evaluation considering site-specific marine life impacts and in situ testing with two different slot openings (that is, 2-millimeter and 6-millimeter slot screens).
- Frequent inspection and cleaning of screens using hydraulic jets from service vessels assisted by divers is essential as part of the maintenance program. The frequency of inspection and diver-assisted cleaning is directly proportional to the seasonal marine growth and debris conditions at screen location. These activities will likely be pursued two to four times per year. This frequency will need to be verified by trending the screen condition after they are placed in operation

4.9.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.9.7 Source Water Substrate Filtering/Collection Systems

There will be a significantly greater operation and maintenance effort associated with the source water substrate filtering collection system technology as compared to the existing shoreline intake. In fact, the level of maintenance needed can be so high and demanding that is not practical. The major maintenance concerns are plugging of the substrate filter media and encrustation or plugging of lateral openings. Due to the vast number of laterals, it will not be practical to manually clean the laterals off deposits/clogging using hydrojets or mechanical brushes.

- Periodic dredging may be required if a buildup of fine materials or organic debris is observed on the substrate.
- Periodic undersea video inspections of laterals will be needed to detect encrustation or plugging of lateral openings.

- Cleaning of laterals using water jet or brush techniques can be performed if encrustation or plugging is observed following an inspection. For a large field of laterals, this will not be practical.

- Limitations of a lateral inspection, maintenance, and cleaning program can result in degradation of the lateral systems and eventual flow reduction to the receiving manifolds, and there may even be flow stoppage.

4.9.8 Variable Speed Cooling Water Pumping Systems

There is no need to evaluate this technology because it has been deemed unacceptable in Section 4.2 for a critical Set A criterion.

5. Conclusion

5.1 Closed-Cycle Cooling Systems

Replacing the DCPP once-through cooling systems with any of the five variants of closed-cycle cooling technologies evaluated is technically feasible. These five variants will, therefore, likely be viewed as complying with the *California Once-Through Cooling Policy* rules on impingement and entrainment reduction because those reductions are considered equivalent to reductions in intake flow rate. Using closed-cycle technology for all of the existing once-through cooling systems, except for safety-related systems and components, results in dramatic reduction of cooling water withdrawals from the Pacific Ocean.

While not an evaluated part of this phase of the study, the saltwater demand of the safety-related, once-through cooling system is approximately 2 to 5 percent of the current total saltwater demand. By substituting closed cooling cycles for all but that system, the saltwater demand is reduced by approximately 95 to 98 percent.

For the wet and hybrid wet/dry cooling technologies, it was determined that saltwater is not feasible for use as the circulating water due to significant PM-10 emissions and lack of related necessary emission offsets, as described in Section 4.1. The only water sources that can be used are fresh and reclaimed water, which are assumed to be available from wells and water treatment facilities, and, thus, impingement/entrainment concerns are eliminated. The dry technologies will not require a continuous water makeup source after the closed system is initially charged because there will be no evaporative or drift losses and makeup will only be required for small system leaks or other minimal operational losses. Thus, impingement/entrainment concerns are minimized.

It must be noted that the feasibility of closed-cycle cooling includes substantial technical and operational challenges. These include routing and constructing the plant infrastructure for the tower circulating/cooling water in such a fashion as to minimize disruption of current operation of both units, the tower location and construction challenges, the significant de-rate of the units' electrical output due to increased condenser back pressure and lower plant efficiency, and the parasitic loads and the added maintenance burden associated with the mechanical draft tower technologies. Equally significant are the predictably challenging permitting process and the visual impacts resulting from the imposing tower sizes and the discharge plumes. The table below highlights the major challenges.

Nonetheless, these challenges do not represent fatal flaws at this stage of the assessment. See Table CC-1 for a summary presentation of the Phase 1 findings and conclusions.

The five variants of closed-cycle cooling are, therefore, candidates for further detailed evaluation in Phase 2 of this study.

	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Estimated Decrease in Turbine Output per Unit, MW	125.5	125.5	52.3	44.4	44.4
Estimated Total Plot Area Requirement for Both Units, ft²	6.4 million	3.0 million	1.2 million	1.8 million	1.8 million
Visible Plume	No	No	Yes	Yes	No
PM-10 Air Emissions	No	No	Yes	Yes	Yes
Required Parasitic Loads per Unit (includes fan power and increased circulating water pump power), MW	7.6	46.9	2.6	17	26.4
Challenging Permitting process	Yes	Yes	Yes	Yes	Yes

5.2 Deepwater Offshore Intake

As described in detail in Section 4.2.2, there is no advantage to locating the intake withdrawal point from the shoreline to a deeper offshore location, since the density of fish and larvae appear to be present at various distances from shore with no statistically significant spatial differences. Reconfiguring the existing shoreline intake system by enclosing the existing inner breakwater, constructing an offshore tunnel and associated shafts, and attaching a set of velocity caps to the tunnel is technically feasible, but improvements in entrainment are not anticipated to be realized at deeper offshore locations. There will be major construction and maintenance challenges for the extensive, high-capacity, deep offshore system.

There is no definitive evidence that the required reductions in entrainments can be achieved with this relocation to a deeper intake site alone, unless it is combined with other measures, such as wedge wire screens.

When considering the environmental impacts and the operational risks posed by the long tunnels, the relocation of the intakes to a deeper offshore location is not expected to produce any appreciable benefits regarding entrainment. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

5.3 Initial Intake Relocation

Modifying the existing shoreline intake system by enclosing the existing inner breakwater, constructing an offshore tunnel and associated shafts, attaching a set of velocity caps to the tunnel, and adding fish collection and return features to traveling water screens is technically feasible. This change will likely be viewed as complying with the *California Once-Through Cooling Policy* rules regarding the reduction of impingement impacts, since the velocity caps inlet velocity will be less than 0.5 fps and a fish collection and return system will be added to the traveling water screens.

Additionally, the use of velocity cap intake will significantly reduce the entry of juvenile and adult fish due to their ability of sensing the horizontal flow field and escaping potential entry, particularly with the very low inlet velocity of 0.5 fps. However, the system cannot ensure significant reduction in entrainment of fish egg and larvae compared to the existing open shoreline intake due to (1) large inlet openings, and (2) no reduction in volumetric flow rate. Given the uncertainty regarding the entrainment mitigation ability of this system, it may be necessary for DCPP to conduct further studies and marine monitoring to assess their compliance with *California Once-Through Cooling Policy* expectations.

A complete evaluation of the offshore technology for the DCPP based on the Section 4 criteria has concluded that this technology should be a candidate for further consideration in the subsequent Phase 2 stage of this assessment.

5.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

Retrofitting the existing pump intake by converting the flow-through screen to a dual-flow type, along with installation of fish mesh panels (1 millimeter x 4 millimeters or 2 millimeters x 6 millimeters), and fish collection/return system will substantially reduce the impingement mortality and entrainment losses. Impinged egg/larvae and fish on the fine mesh will be removed, collected, and returned back to the sea via a new fish return pipeline. The increased debris loading on the fine mesh will be mitigated by using dual flow-type screens with more screen surface area and continuously rotating the screen mesh at speeds up to 40 feet per minute.

Even though this technology does not comply with the maximum 0.5 fps through-screen velocity described in the *California Once-Through Cooling Policy* rules, the inclusion of a fish collection/return system however, provides the additional mitigation measures that support compliancy with the *Once-Through Cooling Policy* requirements. Thus, on the basis of the criteria evaluation against in Section 4, this technology should be a candidate for further evaluation in the pending Phase 2 assessment.

5.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

Modifying the existing shoreline intake system by enclosing one of the existing breakwaters and attaching a new set of manifolds with multiple arrays of wedge wire screen modules to the existing intake cove is technically feasible and will likely be viewed as complying with the *California Once-Through Cooling Policy* rules on the impingement reduction, since the screen through-slot velocity will be less than 0.5 fps. Minimization of juvenile fish and fish larvae impingement and reduction of entrainment of fish egg and larvae associated with the wedge wire screens with a slot size of 6 millimeters, as compared to current open channel system intake, offers some benefits despite the fact that the cooling water withdrawal rate remains unchanged. Given uncertain screen slot size performance attributes, it will be necessary for DCPP to conduct further studies and marine monitoring including in situ testing using two different screen slot openings (that is, 2 millimeter and 6 millimeter) to assess the magnitude of these impingement and entrainment benefits and to evaluate their compliance with *California Once-Through Cooling Policy* expectations. It should be noted that the number of screens required for the SONGS once-through cooling capacity will increase significantly with reducing screen slot sizes, for example, number of screens required for a 2-millimeter slot size will be about twice that for 6-mm slot size.

Based on the criteria evaluation in Section 4, this technology should be a candidate for further consideration in the subsequent Phase 2 stage of this assessment.

5.6 Operational Strategies to Reduce Impingement and Entrainment

As described in Section 4.2.6, 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 with that of the *California Once-Through Cooling Policy* rules. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

5.7 Source Water Substrate Filtering/Collection Systems

While the substrate infiltrating system offers significant reduction in entrainment by screening out fish egg/larvae, screens out juvenile and adult fish, and it complies with impingement mortality rule with less than 0.5 fps intake velocity, this technology is considered a fatal flaw when evaluated against the first-of-a-kind, the operability general site conditions and maintenance criterion. The technology could be theoretically scaled to meet the DCPP flow requirement, but in practice, it cannot be recommended and there is no assurance a maintenance program can maintain the intake system efficiency at 100 percent. This is because, for a large field of horizontal laterals on a once-through cooling system application such as for DCPP, the amount of maintenance needed is not practical or dependable. With likely vegetation growth, silt/clay presence and bio-growth, continuous flow-though laterals cannot be assured. If the ultimate efficiency at end of plant life become 50 percent or 25 percent, respectively, the magnitude of the lateral/filter installation needs to be twice and four times as large as currently presented in this report. This level of uncertainty will not be acceptable.

5.8 Variable Speed Cooling Water Pumping Systems

As described in Section 4.2.8, a variable frequency drive or variable speed pump technology alone would not reduce entrainment or impingement mortality at the DCPP intake to a level sufficient to satisfy the *California Once-Through Cooling Policy* rules. Marginal improvement, up to 20 percent based on optimistic estimates with very conservative assumptions, may be attainable during winter and spring months because of the colder seawater temperature in conjunction with lower power demands. Further impingement improvement, such as lowering the through-screen velocity to 0.5 fps, can be achieved only by the plant reducing flow by over 75 percent, which is outside the capability of the variable speed technology as described above and is not sustainable for a baseload plant.

Because it has been determined that the variable frequency drive or variable speed pump technology, when used as a stand-alone best available technology for impingement and entrainment mitigation, will reduce impingement mortality and entrainment loss to levels commensurate with closed-cycle wet cooling system (a Set A criterion) operation, no additional assessment is made beyond Section 4.3. This technology will not be evaluated further in Phase 2 of this program.

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Table CC-2.
San Luis Obispo Air Pollution Control District Emission Reduction Credit Banking Registry Excerpt (April 2012)

Application Number	Company	Action Date	Action Type	Certificate Number	SOx tons/year Emission Reduction Credits	PM-10 tons/year Emission Reduction Credits
none	CBC Funding	11-5-91	deposit	none	0.000	0.000
1509	SP Milling	03/17/92	deposit	S-2860-ZA-1	0.000	0.644
1619	Union Asphalt	01/15/93	deposit	U-3022-ZA-1	0.000	1.470
1742	Union Asphalt	04/20/93	deposit	U-3022-ZA-2	2.600	0.000
1838	Unocal SMR	06/29/94	deposit	U-3031-ZL-1	0.000	0.000
1838	Unocal SMR	06/29/94	deposit	U-3031-ZL-2	0.000	0.000
1916	Unocal Battles	12/15/96	deposit	SBAPCD none	0.000	0.000
1916	Unocal SMR	12/15/96	withdraw	SBAPCD none	0.000	0.000
1859	Unocal Guad	01/07/97	deposit	U-3032-Z-1	2.968	0.088
1916	Unocal SMR	01/31/97	withdraw	U-3031-ZL-1	0.000	0.000
2043	Unocal SMR	01/31/97	deposit	U-3031-ZL-3	0.000	0.000
2189	Unocal SMR	03/20/97	withdraw	U-3031-ZL-3	0.000	0.000
2189	Unocal SMR	03/20/97	deposit	U-3031-ZL-4	0.000	0.000
2236	Unocal	06/05/97	withdraw	U-3032-Z-1	-2.968	-0.088
2236	Unocal	06/05/97	deposit	U-3032-Z-2	2.968	0.088
2188	Chevron	07/16/97	deposit	C-1215-ZH-1	0.000	0.000
2147	Chevron	07/16/97	deposit	C-1232-Z-2	0.000	0.000
2190	Chevron	07/16/97	deposit	T-2909-ZA-1	0.000	0.000
2192	Chevron	07/16/97	deposit	A-1077-ZA-1	0.000	0.000
2158	Chevron	07/16/97	deposit	C-1232-Z-1	0.000	0.000
2188	Chevron	07/16/97	withdraw	C-1215-ZH-1	0.000	0.000
2147	Chevron	07/16/97	withdraw	C-1232-Z-2	0.000	0.000
2190	Chevron	07/16/97	withdraw	T-2909-ZA-1	0.000	0.000
2192	Chevron	07/16/97	withdraw	A-1077-ZA-1	0.000	0.000
2158	Chevron	07/16/97	withdraw	C-1232-Z-1	0.000	0.000
2268	Unocal	07/27/99	deposit	516-Z	0.290	0.390
2236	Unocal	07/15/99	withdraw	U-3032-Z-2	-2.968	-0.088
2236	Unocal	01/07/97	deposit	U-3032-Z-3	2.968	0.088
2865	Unocal SMR	09/15/99	withdraw	U-3031-ZL-4	0.000	0.000
2865	Tosco SMR	09/15/99	deposit	589-Z1	0.000	0.000
2866	Unocal SMR	09/15/99	withdraw	U-3031-ZL-2	0.000	0.000
2866	Tosco SMR	09/15/99	deposit	590-T1	0.000	0.000
2943	Chevron, Cars	05/10/00	deposit	670-T1	0.000	0.000
2853	Chevron, Estero	07/06/00	deposit	681-Z1	0.000	0.000
2854	Chevron, Estero	07/06/00	deposit	680-Z1	0.000	0.000
2855	Chevron, Estero	07/06/00	deposit		0.000	1.920

Table CC-2.
San Luis Obispo Air Pollution Control District Emission Reduction Credit Banking Registry Excerpt (April 2012) *(cont.)*

Application Number	Company	Action Date	Action Type	Certificate Number	SOx tons/year Emission Reduction Credits	PM-10 tons/year Emission Reduction Credits
2856	Chevron, Estero	07/06/00	deposit	684-Z1	1.230	0.000
2857	Chevron, Estero	07/06/00	deposit	685-Z1	0.000	0.000
Expired	Unocal SMR	06/29/94	withdraw	590-T1	0.000	0.000
2961	Chevron Shandn	09/22/00	deposit	359-Z2		
2980	Chevron Shandn	09/22/00	deposit	690-Z1	0.040	0.000
2981	Chevron Shandn	09/22/00	deposit	691-Z1	0.000	0.480
2982	Chevron Shandn	09/22/00	deposit	692-Z1	0.000	0.000
2983	Chevron Shandn	09/22/00	deposit	693-Z1	zero	0.000
2894	Dynegy	11/20/00	deposit	694-Z1	194.930	17.220
3053	Union Asphalt	01/20/01	withdraw	U-3022-ZA-2	-2.600	0.000
3068	Stocker Resource	05/20/01	deposit	722-Z1	0.000	0.000
2853	Chevron, Estero	4/17/2002	withdraw	681-Z1	0.000	0.000
2854	Chevron, Estero	4/17/2002	withdraw	680-Z1	0.000	0.000
2855	Chevron, Estero	4/17/2002	withdraw	682-Z1	0.000	-1.920
2856	Chevron, Estero	4/17/2002	withdraw	684-Z1	-1.230	0.000
2857	Chevron, Estero	4/17/2002	withdraw	685-Z1	0.000	0.000
3219	Dynegy	04/17/02	deposit	772-Z1	1.230	1.920
2943	Chevron, Cars	04/27/02	withdraw	Expire April 02	0.000	0.000
3068	Stocker Resource	05/20/01	withdraw	722-Z1	0.000	0.000
3111	Philips 66	05/24/02	deposit	780-Z1	1.440	1.610
	Philips 66	05/24/02	deposit	780-CB		
3430	Plains Exp.	08/05/03	deposit	722-Z2	0.000	0.000
3364	Plains Exp.	02/27/04	withdraw	722-Z2	0.000	0.000
3364	Plains Exp.	02/27/04	deposit	722-Z3	0.000	0.000
3111	ConocoPhillips	05/20/04	withdraw	780-Z1	-1.440	-1.610
3521	ConocoPhillips	05/20/04	deposit	780-Z2	1.210	1.610
3559	ConocoPhillips	07/12/04	withdraw	780-Z2	-1.210	-1.610
3559	ConocoPhillips	07/12/04	deposit	780-Z3	1.210	0.120
4048	ConocoPhillips	07/12/04	withdraw	780-Z3	-1.210	-0.120
4048	ConocoPhillips	12/16/05	deposit	780-Z4	1.210	0.120
4048	ConocoPhillips	12/16/05	withdraw	780-Z4	-1.210	-0.120
4048	ConocoPhillips	05/15/05	deposit	780-Z4	1.210	0.070
3875	ConocoPhillips	06/28/06	withdraw	780-Z4	-1.210	-0.070

Table CC-2.
San Luis Obispo Air Pollution Control District Emission Reduction Credit Banking Registry Excerpt (April 2012) *(cont.)*

Application Number	Company	Action Date	Action Type	Certificate Number	SOx tons/year Emission Reduction Credits	PM-10 tons/year Emission Reduction Credits
3855	ConocoPhillips	06/28/06	deposit	780-Z5	1.110	1.534
3855	ConocoPhillips	10/16/06	withdraw	780-Z5	-1.110	-1.534
4246	ConocoPhillips	10/16/06	deposit	780-Z6	1.206	1.533
4376	CB&I Trusco	10/03/07	deposit	1196-Z1	0.000	0.001
4432	ConocoPhillips	02/05/08	deposit	1319-Z1	299.528	7.567
5179	Lime Mountain	08/11/10	deposit	728-Z1	0.005	0.035
5320	ConocoPhillips	04/12/12	withdraw	780-Z6	-1.206	-1.533
5320	Philips 66	04/12/12	deposit	780-Z7	1.205	1.297
name only	ConocoPhillips	04/12/12	withdraw	1319-Z1	-299.528	-7.567
name only	Philips 66	04/12/12	deposit	1319-Z2	299.528	7.567
name only	Tosco SMR	04/12/12	withdraw	589-Z1	0.000	0.000
name only	Philips 66	04/12/12	deposit	589-Z2	0.000	0.000
					SO2	**PM-10**
				TOTAL	**500.196**	**31.112**

Re: Willey, G., San Luis Obispo Air Pollution Control District (personal communication, April 20, 2012) – attached file, BANKLOG_current_Apr_2012.xlsx

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Refashioning of the existing intake system for closed cycle cooling will generate limited or no impacts to waters of the United States. Associated pipeline crossings of Diablo Creek have some potential to impact jurisdictional lands. It is unlikely that an individual form of permit will be required	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps. of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	The modification of the existing intake system for closed cycle cooling will generate limited or no significant impacts to waters of the United States. Associated pipeline crossings of Diablo Creek have some potential to impact jurisdictional lands, so this general formal of the permit could be applicable.	Potentially applicable (1 - 3 months)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because natural draft towers will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC may share the lead agency California CEQA responsibilities for the proposed passive draft dry/air cooling technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A passive draft dry/air cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the passive air-cooled draft tower system, the elevated position of the tower system could result in visual impacts that become a challenging issue.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	NA

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of passive draft dry/air cooling towers and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	NA
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Not applicable - the passive draft dry/air cooling towers will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the passive draft dry/air cooling towers will not generate any 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 passive draft dry/air cooling towers will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	NA	NA

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit that is based on a once-through system. The water withdrawal and discharge will be significantly decreased, but there will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the passive draft dry/air cooling system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the passive draft dry/air cooling towers system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Land disturbances associated with the passive draft dry/air cooling towers will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Potentially applicable - passive draft dry/air cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if passive draft dry/air cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if passive draft dry/air cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process.	No	No
Notification of Waste Activity – Resource Conservation and Recovery Act Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the passive draft dry/air cooling towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not Preconstruction Permit	No	No

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Spill Prevention, Control, and Countermeasure SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services-California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new passive draft dry/air cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support passive draft dry/air cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement.	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation. Part of the cooling facility extends beyond the current DCPP boundaries.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No

Table CC-3
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) *(cont.)*
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) - San Luis Obispo County Department of Environmental Health	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	No new wells to be developed will be developed in support of saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of passive draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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, San Luis Obispo County)	Not applicable – the addition of the tower system is not expected to pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable –the water supply is assumed to be available at the site boundary pending next study phase There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable –the water supply is assumed to be available at the site boundary pending next study phase There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because natural draft towers will be taller than 200 feet above ground level and represent a potential obstruction to local aviation.	1-2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet above ground level and represent a potential obstruction to local aviation.	1-2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	No	No

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed passive draft dry/air cooling technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. passive draft dry/air cooling towers will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the passive draft dry/air cooling system, the elevated position of the tall tower system could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of a passive draft dry/air cooling system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Not applicable - the passive draft dry/air cooling towers will not generate any additional operational air emissions.	Not applicable	NA	NA

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the passive draft dry/air cooling towers will not generate any 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 passive draft dry/air cooling towers will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the passive draft dry/air cooling system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with passive draft dry/air cooling towers will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity –Central Coast Regional Water Quality Control Board	Land disturbances associated with passive draft dry/air cooling towers will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Potentially applicable - passive draft dry/air cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if passive draft dry/air cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if passive draft dry/air cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not Preconstruction Permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new passive draft dry/air cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support passive draft dry/air cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation. Portions of the passive draft air-cooled system extend beyond the DCPP property boundaries.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	The freshwater supply option could demand the addition of onsite wells.	1 -2 weeks (freshwater supply option)	No	No

Table CC-4
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling System (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement.	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not preconstruction approvals	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of passive draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures,	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, San Luis Obispo County)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	1-3 months.	No	No

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Refashioning of the existing intake system for closed-cycle cooling may generate limited or no impacts to waters of the U.S. Work associated with crossings of Diablo Creek have some potential to impact jurisdictional lands.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	The refashioning of the existing intake system for closed cycle cooling will generate limited or no significant impacts to waters of the United States. Associated pipeline crossings of Diablo Creek have some potential to impact jurisdictional lands, so this general formal of the permit could be applicable.	Potentially applicable (1 – 3 months)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the mechanical (forced) draft dry/air cooling tower system will not require any additional federal land.	Not applicable	NA	NA

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed mechanical (forced) draft dry/air cooling technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A mechanical (forced) draft dry/air cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the mechanical (forced) draft dry/air cooling system, the elevated position of the tower system could result in visual impacts that become a challenging issue.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	No
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of an mechanical (forced) draft dry/air cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Not applicable - the mechanical (forced) draft dry/air cooling tower system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the mechanical (forced) draft dry/air cooling tower system will not generate any 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 mechanical (forced) draft dry/air cooling tower system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit that is based on a once-through system. The water withdrawal and discharge will be significantly decreased, but there will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the mechanical (forced) draft dry/air cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft dry/air cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of a NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft dry/air cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Potentially applicable - cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not Preconstruction Permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support mechanical (forced) draft dry/air cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation. Part of the cooling facility extends beyond the current DCPP boundaries.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) - San Luis Obispo County Department of Environmental Health	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	No new wells to be developed will be developed in support of saltwater cooling towers.	Not applicable – saltwater option	NA	NA

Table CC-5
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of mechanical (forced) draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures,	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, San Luis Obispo County)	Not applicable – the addition of the tower system is not expected to pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary– pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary– pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed mechanical air-cooled draft cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. An mechanical (forced) draft dry/air cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the mechanical air-cooled draft tower system, the elevated position of the tower system could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of mechanical air-cooled draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Not applicable - the mechanical draft air-cooled towers system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the mechanical (forced) draft dry/air cooling system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - the mechanical (forced) draft dry/air cooling system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the mechanical (forced) draft dry/air cooling system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft dry/air cooling system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity –Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft dry/air cooling system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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) – California Department of Fish & Game	Potentially applicable - cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not Preconstruction Permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services - California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support mechanical air-cooled draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation. Portions of the mechanical draft air-cooled system extend beyond the DCPP property boundaries.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) - San Luis Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	The freshwater supply option could demand the addition of onsite wells.	1 -2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not preconstruction approvals	No	No

Table CC-6
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of mechanical (forced) draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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, San Luis Obispo County)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	1-3 months	No	No

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Refashioning of the existing intake system for closed-cycle cooling is likely to generate limited impacts to waters of the U.S. Work associated with crossings of Diablo Creek could represent significant impacts. Individual form of permit will be required	120 days from complete application (goal) ~12 months (expected)	Potential	No
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the Diablo Creek crossing may generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because wet natural draft cooling towers will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed wet natural draft cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A wet natural draft cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the wet natural draft cooling tower system (excluding PM-10 emission offset issue), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of wet natural draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District– well below the expected annual PM-10 emissions from the facility. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	Potentially	Yes

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District– well below the expected annual PM-10 emissions from the facility t. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	No	Yes
Title V Federal Operating Permit –San Luis Obispo Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful	No	Yes
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit that is based on a once-through system. The water withdrawal and discharge will be significantly decreased, but there will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the wet natural draft cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Potentially applicable - cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not preconstruction permit	No	No

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support wet natural draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement.	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No

Table CC-7
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) - San Luis Obispo County Department of Environmental Health	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	No new wells will be developed in support of saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of wet natural draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures,	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, San Luis Obispo County)	Not applicable – the addition of the tower system is not expected to pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – Pending next study phase. There are no impacts to jurisdictional waters, , except potentially for some more limited impacts associated with the pipeline crossing of Diablo Creek, which may be subject to Nationwide Permitting.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – if the water supply is assumed to be available at the site boundary –pending next study phase. There are no impacts to jurisdictional waters, except for the limited impacts associated with a potential pipeline crossing of Diablo Creek which could be subject to Nationwide Permitting.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Pipelines could cross riparian habitat along Diablo Creek and impact jurisdictional water.	Potentially applicable (1 – 3 months)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because wet natural draft cooling towers will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet agl and represent a potential obstruction to local aviation.	1-2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed wet natural draft cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) > 50 MW, the threshold for review by the CEC. An wet natural draft cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the wet natural draft cooling tower system, the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of wet natural draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	With freshwater and reclaimed water, the wet natural draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - a Title V Federal Operating Permit will not be needed for the freshwater or reclaimed water options.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the wet natural draft cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity –Central Coast Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, unless current DCPP ID will be used.	1-2 weeks	No	No

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not Preconstruction Permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services - California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support wet natural draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	The freshwater supply option could demand the addition of onsite wells.	1-2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not preconstruction approvals	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of wet natural draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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

Table CC-8
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling Towers (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Road Crossing or Encroachment Permit (Caltrans, San Luis Obispo County)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	1-3 months	No	No

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Refashioning of the existing intake system for closed-cycle cooling will not generate significant impacts to waters of the U.S. Work associated with crossings of Diablo Creek could present significant impacts. Individual form of permit will be required	120 days from complete application (goal) ~12 months (expected)	Potential	No
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the Diablo Creek crossings may generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable - wet mechanical draft cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable - wet mechanical draft cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed mechanical (forced) draft cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) > 50 MW, the threshold for review by the CEC. A mechanical (forced) draft cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the mechanical (forced) draft cooling tower system (excluding PM-10 emission offset issue), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of and mechanical (forced) draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District, will below the expected annual PM-10 emissions from the facility. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	Potentially	Yes
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District well below the annual PM-10 emissions from the facility. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	No	Yes
Title V Federal Operating Permit –San Luis Obispo Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful	No	Yes
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit that is based on a once-through system. The water withdrawal and discharge will be significantly decreased, but there will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the mechanical (forced) draft cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Potentially applicable - cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, unless current DCPP ID will be used.	1-2 weeks	No	No

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not preconstruction permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support mechanical (forced) draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	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	No new wells will be developed in support of saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of mechanical (forced) draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures,	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

Table CC-9
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Road Crossing or Encroachment Permit (Caltrans, San Luis Obispo County)	Not applicable – the addition of the tower system is not expected to pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed) Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters, except potentially for some more limited impacts associated with the pipeline crossing of Diablo Creek, which may be subject to Nationwide Permitting.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – if the water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters, excerpt for the limited impacts associated with a potential pipeline crossing of Diablo Creek which could be subject to Nationwide Permitting.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Pipelines could cross riparian habitat along Diablo Creek and impact jurisdictional waters.	Potentially applicable (1– 3 months)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – mechanical (forced) draft cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – mechanical (forced) draft cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed mechanical (forced) draft cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) > 50 MW, the threshold for review by the CEC. A mechanical (forced) draft cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the DCPP property. While there are no initial fatal flaws with the mechanical (forced) draft cooling tower system, the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of mechanical (forced) draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	With freshwater and reclaimed water, the mechanical (forced) draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	With freshwater and reclaimed water, the mechanical (forced) draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - a Title V Federal Operating Permit will not be needed for the freshwater or reclaimed water options.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, that is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the mechanical (forced) draft cooling tower system is not expected to generate significant issues.	~6 months	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity –Central Coast Regional Water Quality Control Board	Land disturbances associated with the mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements –Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4-6 months	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not preconstruction permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support mechanical (forced) draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	The freshwater supply option could demand the addition of onsite wells.	1 -2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Wet Mechanical Draft (Forced) (Fresh and Reclaimed) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not preconstruction approvals	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of mechanical (forced) draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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, San Luis Obispo County)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	1-3 months	No	No

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Refashioning of the existing intake system for closed-cycle cooling will not generate significant impacts to waters of the United States. Work associated with crossings of Diablo Creek could also represent significant impacts. Individual form of permit will be required.	120 days from complete application (goal), actual duration could be much longer	Potential	No
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	120 days from complete application (goal) ~12 months (expected)	Potential	No
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the refashioning of the existing intake system for closed-cycle cooling will generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat. Pipelines will cross riparian habitat along Diablo Creek.	Part of CEQA review process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable - hybrid wet/dry cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable - hybrid wet/dry cooling towers will be less than 200 feet agl threshold for FAA review.	Not applicable	NA	NA

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed hybrid wet/dry cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. Hybrid wet/dry cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone, which includes all of the DCPP property. While there are no initial fatal flaws with the hybrid wet/dry cooling tower system (excluding PM-10 emission offset issue), the significant construction in the coastal zone could be an issue.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	No
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of hybrid wet/dry cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District– well below the expected the annual PM-10 emissions from the facility. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	Potentially	Yes
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Luis Obispo Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 31 tons of PM-10 credits are available in this District– well below the expected the annual PM-10 emissions from the facility. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	No	Yes
Title V Federal Operating Permit –San Luis Obispo Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful	No	Yes
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit that is based on a once-through system. The water withdrawal and discharge will be significantly decreased, but there will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the hybrid wet/dry cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the hybrid wet/dry cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Land disturbances associated with the hybrid wet/dry cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Potentially applicable - cooling tower site area will impact undeveloped upland areas that could include grassland and chaparral habitat. There will also be water pipeline crossings of the riparian habitat along Diablo Creek.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements– Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, unless current DCPP ID will be used.	1-2 weeks	No	No

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not preconstruction permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support hybrid wet/dry cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement.	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	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	No new wells will be developed in support of saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of hybrid wet/dry cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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

Table CC-11
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Saltwater)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Road Crossing or Encroachment Permit (Caltrans, San Luis Obispo County)	Not applicable – the addition of the hybrid wet/dry cooling tower system is not expected to pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water)
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – if project does not constitute major federal action (federal land, funding). Please note that if NEPA is triggered it could involve a 12-18 month review period.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters, except potentially for some more limited impacts associated with the pipeline crossing of Diablo Creek, which may be subject to Nationwide Permitting.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – if the water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters, excerpt for the limited impacts associated with a potential pipeline crossing of Diablo Creek which could be subject to Nationwide Permitting	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Pipelines could cross riparian habitat along Diablo Creek and impact jurisdictional waters	Potentially applicable (1 – 3)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	The tower construction will impact unoccupied, potentially undeveloped land that could include grassland and chaparral habitat.	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable - hybrid wet/dry cooling towers will be less than 200 feet agl threshold for FAA review.	1-2 months	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable - hybrid wet/dry cooling towers will be less than 200 feet agl threshold for FAA review.	1-2 months	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the cooling tower system will not require any additional federal land.	Not applicable	NA	NA

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency CEQA responsibilities for the proposed hybrid wet/dry cooling tower technology. The CEQA review process trigger development of a comprehensive EIR.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable - this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. hybrid wet/dry cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone, which includes all of the DCPP property. While there are no initial fatal flaws with the hybrid wet/dry cooling tower system, the significant construction in the coastal zone could be an issue.	A 3 to 9 month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential California Environmental Quality Act Lead Agency	The State Land Commission will evaluate the expected impacts to marine environment associated with addition of hybrid wet/dry cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Authority to Construct – San Luis Obispo Air Pollution Control District	With freshwater and reclaimed water, the hybrid wet/dry cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	With freshwater and reclaimed water, the hybrid wet/dry cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - a Title V Federal Operating Permit will not be needed for the freshwater or reclaimed water options.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Control Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the hybrid wet/dry cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Land disturbances associated with the hybrid wet/dry cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	Electronic submittal – 1 week process	No	No

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity –Central Coast Regional Water Quality Control Board	Land disturbances associated with the hybrid wet/dry cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of an NOI and development of an SWPPP.	SWPPP development process (3-months)	No	No
Notice of Intent– National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	Not applicable - if eventual cooling tower site area is within a developed or disturbed area.	Potentially, part of CEQA Review	No	No
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1-2 months, (if application complete) Note recent history indicates this could extend to 4 to 6 months	No	No
Waste Discharge Requirements –Central Coast Regional Water Quality Control Board	Potentially applicable - if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4-6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Potentially necessary for construction of the towers, 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	DCPP likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not preconstruction permit	No	No
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	DCPP will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1-2 months plan development	No	No
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1-2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new volatile chemicals are needed to support hybrid wet/dry cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water) Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	The county will likely evaluate consistency of the proposed cooling tower development with the current land use designation.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	A Conditional Use Plan will be issued based on the findings of the CEQA review process.	Dependent of the duration of the CEQA/EIR process (>1 year)	Potential	Potential
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Grading plan permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county.	See SWPPP discussion in this table	No	No
Building Permit (including plumbing and electrical) – San Luis Obispo County Building Division	Building permits will be necessary to support construction.	4-6 weeks –following completion of CEQA and conditional use permit	No	No
Domestic Water Supply Permit (public potable water) - San Luis Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	The freshwater supply option could demand the addition of onsite wells.	1 -2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement.	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable - if some of the tower elements prove to be oversized.	Not a preconstruction requirement.	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Local power poles may be needed during the course of construction.	Not preconstruction approvals	No	No

Table CC-12.
Environmental Permit/Approval Assessment: Hybrid Wet/Dry Cooling (Fresh and Reclaimed Water)
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	While the addition of hybrid wet/dry cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	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, San Luis Obispo County)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	1-3 months.	No	No

Table CC-13. Offsetting Impacts for Passive Draft Dry/Air Cooling Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NOx, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the associated plant outages and the ongoing decreases DCPP output from associated auxiliary loads and reduced thermal efficiency. There are no drift losses or condensed plume from operation of this system. Consequently, there are no particulate emissions (salt) or related impacts.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	Small Negative
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling, and related spills. Construction activities will have some potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater - significantly reduced seawater withdrawals, reduced thermal impacts (lower temperature, reduced flow), and increased residual biocides in the cooling system. Fresh and reclaimed water - an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Significant ground surface impacts and related earthwork. See Section 4.8	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)

Table CC-13. Offsetting Impacts for Passive Draft Dry/Air Cooling Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Groundwater	Additional groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete) – but this is unlikely	Onsite groundwater resources will not be used in support of saltwater passive draft dry/air cooling tower operation. Groundwater could be used to satisfy or contribute to the operational water needs of the freshwater passive draft dry/air cooling towers or used to supplement the water needs of the reclaimed water cooling tower system.	Minimal for dry technologies	None	Small Positive (saltwater) Small Negative (freshwater and reclaimed water)
Marine Ecological Resources	Saltwater - new localized minor disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and reclaimed water – no impacts to marine resources.	Permanent loss of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (+95% reduction in withdrawals, influent velocity < 0.5 fps and reduced and appropriate screening). Freshwater and reclaimed water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Loss of acres of 0.35 acres of sub-tidal habitat. (Enercon, 2009) +95% reduction in water withdrawals	Limited Negative or None	Large Positive

Table CC-13.
Offsetting Impacts for Passive Draft Dry/Air Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Waste	Increased generation of demolition and construction-related wastes. There will be significant earthwork – soil material balance to be developed in later assessment.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase. See Section 4.8 for estimated excavation requirements.	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications. Large buffer zones.	Increased noise from operation of the cooling tower system (pump, and motor noise). Impacts to distant public are unlikely.	Construction activities and operation of the passive draft dry/air cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBa at nearest public noise receptor).	None	None
Land Use	Construction activities will be occurring on previously occupied, undeveloped or undisturbed land and require expansion of the current site boundaries. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes and the expansion of the DCPP property boundary.	See Section 4.8 for estimated construction and excavation areas.	Large Negative	Large Negative
Terrestrial Ecological Resources	Construction will be confined to the largely undeveloped area with some habitat value north of the power block area, but also involve crossing a more sensitive and valuable riparian habitat along Diablo Creek.	The tower system is will result in some permanent loss of modest upland habitats and some permanent impacts to small portions of the riparian habitat along Diablo Creek.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative

Table CC-13.
Offsetting Impacts for Passive Draft Dry/Air Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Limited to potential for discovery of new cultural or paleontological resources during construction in the largely undeveloped area north of the power block area and in the expected pipeline crossings of the Diablo Creek.	Permanent loss of upland areas with limited potential for cultural and paleontological resources.	Limited potential for discovering resources.	Small Negative	Small Negative
Visual Resources	The construction efforts for the tall passive draft dry/air cooling system will still be very visible on the elevated terrain north of the power block area.	Even without a visible plume, the tall passive draft dry/air cooling system will be very visible on the elevated terrain north of the power block area.	See Section 3 for description of technology, including heights	Large Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	There will be no condensed plume and so additional fogging or icing impacts.	Traffic impacts details are pending next study phase.	Small Negative	None
Socioeconomic	While there will be 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 may increase to address cooling tower system operation. There is some minor potential for negative impacts to housing and property markets.	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable or are minor, such that 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.

Table CC-14.
Offsetting Impacts for Mechanical (Forced) Draft Dry/Air Cooling
Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gas, NOx, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the associated plant outages and the ongoing decreases DCPP output from associated auxiliary loads and reduced thermal efficiency. There are no drift losses or condensed plume from operation of this system. Consequently, there are no particulate emissions (salt) or related impacts.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	Small Negative
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater - significantly reduced seawater withdrawals, reduced thermal impacts (lower temperature, reduced flow), and increased residual biocides in the cooling system. Fresh and Reclaimed Water - an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Significant ground surface impacts and related earthwork. See Section 4.8	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)

Table CC-14.
Offsetting Impacts for Mechanical (Forced) Draft Dry/Air Cooling Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Groundwater	Additional groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), but this is unlikely	Onsite groundwater resources will not be used in support of saltwater mechanical (forced) draft dry/air cooling tower operation. Groundwater could be used to satisfy or contribute to the operational water needs of the freshwater mechanical (forced) draft dry/air cooling towers or used to supplement the water needs of the reclaimed water cooling tower system.	Minimal for dry technologies	None	Small Positive (saltwater) Small Negative (freshwater and reclaimed water)
Marine Ecological Resources	Saltwater - new limited localized disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Permanent lost of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (+95% reduction in withdrawals, influent velocity < 0.5 fps and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Loss of acres of 0.35 acres of sub-tidal habitat. (Enercon, 2009) +95% reduction in water withdrawals	Limited Negative or None	Large Positive

Table CC-14.
Offsetting Impacts for Mechanical (Forced) Draft Dry/Air Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Waste	Increased generation of demolition and construction-related wastes. There will be significant earthwork – soil material balance to be developed in later assessment.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase. See Section 4.8 for estimated excavation requirements.	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications. Large buffer zones.	Increased noise from operation of the cooling tower system (fan, pump, and motor noise). Impacts to distant public unlikely.	Construction activities and operation of the mechanical (forced) draft dry/air cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBa at nearest public noise receptor).	None	None
Land Use	Construction activities will be occurring on previously occupied, undeveloped or undisturbed land and require expansion of the current site boundaries. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes and the expansion of the DCPP property boundary.	See Section 4.8 for estimated construction and excavation areas.	Large Negative	Large Negative
Terrestrial Ecological Resources	Construction will be confined to the largely undeveloped area with some habitat value north of the power block area, but also involve crossing a more sensitive and valuable riparian habitat along Diablo Creek.	The tower system will result in some permanent loss of modest upland habitats and some permanent impacts to small portions of the riparian habitat along Diablo Creek.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative

Table CC-14.
Offsetting Impacts for Mechanical (Forced) Draft Dry/Air Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Limited to potential for discovery of new cultural or paleontological resources during construction in the largely undeveloped area north of the power block area and in the expected pipeline crossings of the Diablo Creek.	Permanent loss of upland areas with limited potential for cultural and paleontological resources.	Limited potential to discover resources.	Small Negative	Small Negative
Visual Resources	The construction efforts for the relatively low profile mechanical (forced) draft dry/air cooling system will still be very visible on the elevated terrain north of the power block area.	Even without a visible plume, the mechanical (forced) draft dry/air cooling system will be very visible on the elevated terrain north of the power block area.	See Section 3 for description of technology, including heights	Large Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	There will be no condensed plume and so additional fogging or icing impacts.	See Section 4.8 for estimated construction duration.	Small Negative	None
Socioeconomic	While there will be 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 may increase to address cooling tower system operation. There is some minor potential for negative impacts to housing and property markets	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact of Significance
Small: Environmental effects are not detectable or are minor, such that 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.

Table CC-15.
Offsetting Impacts for Wet Natural Draft
Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NOx, VOC, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short-term loss of DCPP generation during the associated plant outages and the ongoing decreases DCPP output from associated auxiliary loads and reduced thermal efficiency. Saltwater - Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased VOC emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water: Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional 10,318,500 tons of CO_2 greenhouse gas emissions from associated plant outages. (Enercon, 2009) Additional 180, 500 tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. (Enercon, 2009) Additional 992 tons/year of PM-10 from cooling systems. (Enercon, 2009) Additional +500 tons of VOC from painting and refinishing operations. (Enercon, 2009)	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-15.
Offsetting Impacts for Wet Natural Draft
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater - significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water - decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Velocity and flow characterization (pending later assessment)	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)

Table CC-15.
Offsetting Impacts for Wet Natural Draft
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Groundwater	Additional groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), but it is unlikely	Onsite groundwater resources will not be used in support of saltwater wet natural draft cooling tower operation. Groundwater could be used to satisfy or contribute to the operational water needs of the freshwater wet natural draft cooling towers or used to supplement the water needs of the reclaimed water cooling tower system.	See Section 3 for description of technology, including quantification of makeup requirements.	None	Small Positive (saltwater) Moderate Negative (freshwater and reclaimed water)
Marine Ecological Resources	Saltwater - new localized minor disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (90-95% reduction in withdrawals, influent velocity < 0.5 fps and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Loss of acres of 0.35 acres of sub-tidal habitat. (Enercon, 2009) +95% reduction in water withdrawals	Limited Negative or None	Large Positive

Table CC-15.
Offsetting Impacts for Wet Natural Draft
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Waste	Increased generation of demolition and construction-related wastes. There will be significant earthwork – soil material balance to be developed in later assessment.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase. Generation of 3,600 yd^3 of construction wastes to landfill. (Enercon, 2009)	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications. Large buffers zones.	Increased noise from operation of the cooling tower system (cascading water, pump, and motor noise). Impacts to distant public unlikely.	Construction activities and operation of the wet natural draft cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBa at nearest public noise receptor).	None	None
Land Use	Construction activities will be occurring on previously occupied, undeveloped or undisturbed land. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Construction will be confined to the largely undeveloped area with some habitat value north of the power block area, but also involve crossing a more sensitive and valuable riparian habitat along Diablo Creek.	The tower system is will result in some permanent loss of modest upland habitats and some permanent impacts to small portions of the riparian habitat along Diablo Creek. There may be some salt deposition impacts to salt sensitive vegetation.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative

Table CC-15. Offsetting Impacts for Wet Natural Draft Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Limited to potential for discovery of new cultural or paleontological resources during construction in the largely undeveloped area north of the power block area and in the expected pipeline crossings of the Diablo Creek.	Permanent loss of upland areas with limited potential for cultural and paleontological resources. Increased salt deposition from the saltwater tower operation may accelerate decay of local surface resources.	Salt deposition 916 ton/year on surrounding lands (Tetra Tech) from saltwater tower.	Small Negative	Small Negative
Visual Resources	New temporary visual impact to local areas from construction cranes and other high-profile construction equipment.	Generation of significant visual impacts from tall cooling tower structures and the associated plumes, including possible impacts to local aviation.	Plume length > 5 miles Plume height > 2500 feet Plume visibility – 300 events/year for (Enercon, 2009)	Moderate Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Increased hours of local fogging and icing on local roads and impacts to local aviation.	See Section 4.8 for estimated construction duration. Detailed analysis of fogging and icing severity pending later assessment phase.	Small Negative	Moderate Negative
Socioeconomic	While there will be 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 may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable or are minor, such that 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.

Table CC-16.
Offsetting Impacts for Wet Mechanical (Forced)
Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NOx, VOC, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the associated plant outages and the ongoing decreases DCPP output from associated auxiliary loads and reduced thermal efficiency. Saltwater - Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased VOC emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water: Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional 10,318,500 tons of CO_2 greenhouse gas emissions from associated plant outages. (Enercon, 2009) Additional 180, 500 tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. (Enercon, 2009) Additional 992 tons/year of PM-10 from cooling systems. (Enercon, 2009) Additional +500 tons of VOC from painting and refinishing operations. (Enercon, 2009)	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-16.
Offsetting Impacts for Wet Mechanical (Forced)
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater - significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water - decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Velocity and flow characterization (pending later assessment)	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)

Table CC-16.
Offsetting Impacts for Wet Mechanical (Forced)
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Groundwater	Additional groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), but this unlikely	Onsite groundwater resources will not be used in support of saltwater mechanical (forced) draft cooling tower operation. Groundwater could be used to satisfy or contribute to the operational water needs of the freshwater mechanical (forced) draft cooling towers or used to supplement the water needs of the reclaimed water cooling tower system.	See Section 3 for description of technology, including quantification of makeup requirements.	None.	Small Positive (saltwater) Moderate Negative (freshwater and reclaimed water)
Marine Ecological Resources	Saltwater - new localized minor disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (90-95% reduction in withdrawals, influent velocity < 0.5 fps second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Loss of acres of 0.35 acres of sub-tidal habitat. (Enercon, 2009) +95% reduction in water withdrawals	Limited Negative or None	Large Positive

Table CC-16.
Offsetting Impacts for Wet Mechanical (Forced) Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Waste	Increased generation of demolition and construction-related wastes. There will be significant earthwork – soil material balance to be developed in later assessment.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase. Generation of 3,600 yd^3 of construction wastes to landfill. (Enercon, 2009)	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications. Large buffer zones.	Increased noise from operation of the cooling tower system (cascading water, fans, pump, and motor noise). Impacts to distant public unlikely.	Construction activities and operation of the wet natural draft cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBa at nearest public noise receptor).	None	None
Land Use	Construction activities will be occurring on previously occupied, undeveloped or undisturbed land. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Construction will be confined to the largely undeveloped area with some habitat value north of the power block area, but also involve crossing a more sensitive and valuable riparian habitat along Diablo Creek.	The tower system is will result in some permanent loss of modest upland habitats and some permanent impacts to small portions of the riparian habitat along Diablo Creek. There may be some salt deposition impacts to salt sensitive vegetation.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative

Table CC-16.
Offsetting Impacts for Wet Mechanical (Forced)
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Limited to potential for discovery of new cultural or paleontological resources during construction in the largely undeveloped area north of the power block area and in the expected pipeline crossings of the Diablo Creek.	Permanent loss of upland areas with limited potential for cultural and paleontological resources. Increased salt deposition from the saltwater tower operation may accelerate decay of local surface resources.	Salt deposition 916 ton/year on surrounding lands (Tetra Tech) from saltwater tower.	Small Negative	Small Negative
Visual Resources	The construction efforts for the relatively low profile mechanical (forced) draft cooling towers will still be very visible on the elevated terrain north of the power block area.	Generation of significant visual impacts from cooling tower plumes from relatively low profile structures.	Plume length > 5 miles Plume height > 2500 feet Plume visibility – 300 events/year for (Enercon, 2009)	Moderate Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Increased hours of local fogging and icing on local roads and impacts to local aviation.	See Section 4.8 for estimated construction duration. Detailed analysis of fogging and icing severity pending later assessment phase.	Small Negative	Moderate Negative
Socioeconomic	While there will be 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 may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable or are minor, such that 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.

Table CC-17.
Offsetting Impacts for Hybrid Wet/Dry Cooling
Diablo Canyon Power Plant

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NOx, VOC, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the associated plant outages and the ongoing decreases DCPP output from associated auxiliary loads and reduced thermal efficiency. Saltwater - Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased VOC emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water: Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional 10,318,500 tons of CO_2 greenhouse gas emissions from associated plant outages. (Enercon, 2009) Additional 180, 500 tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. (Enercon, 2009) Additional 992 tons/year of PM-10 from cooling systems. (Enercon, 2009) Additional +500 tons of VOC from painting and refinishing operations. (Enercon, 2009)	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-17.
Offsetting Impacts for Hybrid Wet/Dry Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have the potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater - significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water - decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Velocity and flow characterization (pending later assessment)	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)
Groundwater	Additional groundwater resources could be used to satisfy increase freshwater construction water demands (compaction, dust control, concrete), but this unlikely	Onsite groundwater resources will not be used in support of saltwater hybrid wet/dry cooling tower operation. Groundwater could be used to satisfy or contribute to the operational water needs of the freshwater hybrid wet/dry cooling towers or used to supplement the water needs of the reclaimed water cooling tower system.	See Section 3 for description of technology, including quantification of makeup requirements.	None	None (saltwater) Moderate Negative (freshwater and reclaimed water)

Table CC-17.
Offsetting Impacts for Hybrid Wet/Dry Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Saltwater - new localized minor disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (90-95% reduction in withdrawals, influent velocity < 0.5 fps second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Loss of acres of 0.35 acres of sub-tidal habitat. (Enercon, 2009) +95% reduction in water withdrawals	Limited Negative or None	Large Positive
Waste	Increased generation of demolition and construction-related wastes. There will be significant earthwork – soil material balance to be developed in later assessment.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase. Generation of 3,600 yd^3 of construction wastes to landfill. (Enercon, 2009)	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications. Large buffer zones.	Increased noise from operation of the cooling tower system (cascading water, fans, pump, and motor noise). Impacts to distant public unlikely.	Construction activities and operation of the Hybrid cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBa at nearest public noise receptor).	None	None

Table CC-17.
Offsetting Impacts for Hybrid Wet/Dry Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities will be occurring on previously occupied, undeveloped or undisturbed land. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Construction will be confined to the largely undeveloped area with some habitat value north of the power block area, but also involve crossing a more sensitive and valuable riparian habitat along Diablo Creek.	The tower system is will result in some permanent loss of modest upland habitats and some permanent impacts to small portions of the riparian habitat along Diablo Creek. There may be some salt deposition impacts to salt sensitive vegetation.	See Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative
Cultural & Paleontological Resources	Limited to potential for discovery of new cultural or paleontological resources during construction in the largely undeveloped area north of the power block area and in the expected pipeline crossings of the Diablo Creek.	Permanent loss of upland areas with limited potential for cultural and paleontological resources. Increased salt deposition from the saltwater tower operation may accelerate decay of local surface resources.	Salt deposition 916 ton/year on surrounding lands (Tetra Tech) from saltwater tower.	Small Negative	Small Negative
Visual Resources	The 175 foot towers arranged up a hillside will be a prominent feature in what had been an undeveloped area.	Plume abatement features will mitigate visible plume issue, but towers will remain prominent feature on a previously undeveloped area.	Prominent visual feature	Moderate Negative	Moderate Negative

Table CC-17.
Offsetting Impacts for Hybrid Wet/Dry Cooling
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Limited additional fogging and icing impacts on local roads and impacts to local aviation.	See Section 4.8 for estimated construction duration. Detailed analysis of fogging and icing severity pending later assessment phase.	Small Negative	Small Negative
Socioeconomic	While there will be 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 may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable or are minor, such that 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.

Table CC-18.
Major Cooling Tower Maintenance Activities
Diablo Canyon Power Plant

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Check condition of finned-tube heat exchangers	Quarterly	✓	✓			✓
Cleaning of fins on heat exchanger tube bundles	Semiannually or as needed	✓	✓			✓
Operating ball cleaning system for tube internal surfaces	Semiannually or as needed	✓	✓			✓
Check for and repair/replace missing or broken water distribution pipes or nozzles	Monthly	✓	✓	✓	✓	✓
Weigh fill packs to characterize fouling	Annually			✓	✓	✓
Check for and repair/replace missing or broken fill packs	Quarterly			✓	✓	✓
Check for and repair/replace missing or broken drift eliminator packs	Quarterly			✓	✓	✓
Check for and repair/replace missing or broken drift eliminator seals	Quarterly			✓	✓	✓
Check oil level in gear box	Daily		✓		✓	✓
Check for foreign material in gear box oil	Every 2 weeks		✓		✓	✓
Replace oil in gear box	Semiannually		✓		✓	✓
Check backlash and endplay of gear box shafts	Semiannually		✓		✓	✓

Table CC-18.
Major Cooling Tower Maintenance Activities
Diablo Canyon Power Plant *(cont.)*

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Mechanical (Forced) Draft Cooling	Hybrid
Ensure no buildup or other deposits are present on exterior surface of gear box (any inhibitors of proper cooling)	Semiannually		✓		✓	✓
Inspect gear box gears for wear and corrosion	Semiannually		✓		✓	✓
Check and adjust alignment of driveshaft	Semiannually		✓		✓	✓
Check and adjust fan pitch angles	Quarterly		✓		✓	✓
Check and adjust fan blade tracking	Quarterly		✓		✓	✓
Check and adjust fan blade tip clearance	Quarterly		✓		✓	✓
Check tightness of fan bolts	Quarterly		✓		✓	✓
Ensure fan weepholes are clear	Quarterly		✓		✓	✓
Check tightness of structural connecting bolts	Annually	✓	✓	✓	✓	✓
Check for and replace any fan blade wear or defects	Quarterly		✓		✓	✓
Check operating mechanical equipment for excessive noise	Daily		✓		✓	✓
Check vibration levels of operating mechanical equipment	Daily		✓		✓	✓
Check condition and repair if necessary – concrete shell	Annually	✓		✓		
Check proper attachment and condition of the airseal	Annually			✓		
Check condition of protective epoxy coating/sheeting - steel shell	Annually			✓		
Check for scale, algae, etc. to ensure water treatment is adequate	Weekly			✓	✓	✓

Table CC-18.
Major Cooling Tower Maintenance Activities
Diablo Canyon Power Plant *(cont.)*

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Mechanical (Forced) Draft Cooling	Hybrid
Check cold water basin level	Daily			✓	✓	✓
Inspect cold water basin and repair any cracks or coating defects as necessary	Semiannually			✓	✓	✓
Relubricate motor bearings	Semiannually		✓		✓	✓
Ensure no buildup or other deposits are present on exterior surface of motor (any inhibitors of proper motor cooling)	Semiannually		✓		✓	✓
Check proper operation of valves	Monthly	✓	✓	✓	✓	✓
Lubricate valves	Quarterly	✓	✓	✓	✓	✓
Check proper operation of dampers	Monthly					✓
Check condition of flanged and threaded connections and replace gaskets as necessary	Monthly	✓	✓	✓	✓	✓
Check steel structures for evidence of corrosion	Annually	✓	✓	✓	✓	✓
Check function of and replace bulbs as necessary – aircraft warning lights on top of shell	Daily	✓		✓		

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the deepwater intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the deepwater intake system, tunneling will generate significant impacts to waters of U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	The Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the installation of the deepwater intake system will generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the deepwater intake system will pose significant impacts marine habitat and aquatic life and also serve to reduce operational impingement and entrainment losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable - the addition of the addition of the deepwater intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Facilities	Not applicable - the addition of the deepwater intake system 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 or Other Responsible Federal Agency	Not applicable - the addition of the deepwater intake system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utilities Commission Approval	CPUC will likely be the Lead Agency for the CEQA review process regarding the proposed deepwater intake system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the deepwater intake system 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	Applicable because of the considerable offshore and nearshore development within the coastal zone While there are no specific fatal flaws with the deepwater intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the deepwater intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct – San Luis Obispo Regional Air Pollution Control District	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - the deepwater intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable – construction of the deepwater intake system is expected to disturb some limited onshore area so there is some potential for localized dust emissions which are likely insufficient to demand a control plan. The deepwater intake system, itself, will not generate any additional air emissions.	If applicable (< 1 month)	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Board	The deepwater intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable – construction of the deepwater intake system is expected to disturb a limited onshore area, but not significantly alter storm water management features onsite.	Not applicable (if impacted area < 1 acre)	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable – construction of the deepwater intake system is expected to disturb a limited onshore area, but not significantly alter storm water management features onsite.	Not applicable (if impacted area <1 acre)	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the deepwater intake system.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	The installation of the deepwater intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable – the addition of the deepwater intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable – the addition of the deepwater intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable - the deepwater intake system will demand a small onshore area which has previously been disturbed.	Not applicable	NA	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 Environment Health Services - California Unified Program Agency	Installation of the deepwater intake system could potentially require an ID number to support management or construction wastes, unless current DCPP ID will be used.	1-2 weeks	No	No

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the deepwater intake system will allow for the continuing use of the existing hazardous waste ID number. There will be no 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 Environmental Health Services- California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the addition of the deepwater intake system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system 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 addition of the deepwater intake system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of largely offshore submerged facility may pose some jurisdictional issues, the deepwater intake system will likely be addressed by 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 onsite grading during the installation of the offshore deepwater intake system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County 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 Obispo County Building Division	Not applicable - the addition of the deepwater intake system may demand an individual or set of county Building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) -San Luis Obispo County Department of Environmental Health	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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	The deepwater intake elements and associated piping are likely to be oversized.	<1 month	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	The velocity cap elements and associated piping are likely to be oversized.	<1 month	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the installation of the deepwater intake system 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 addition of deepwater intake system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of deepwater intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
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 gases emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the plant outage to install wedge system.	While the deepwater intake system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	See Section 4.8 for related details.	Moderate Negative - tunneling	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None
Waste	A significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Increase in waste generation is expected from maintenance activities on the new velocity cap system in deeper water and potential kelp interactions.	Marine Spoil Wastes (pending subsequent assessments)	Moderate Negative	Moderate Negative

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the deepwater intake system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters. There is 1 mile exclusion zone that limited public access around the facility.	The deepwater intake system and associated piping represent a change in land use of the marine bed and could preclude some water borne activities. There is a 1 mile exclusion zone to public activities and water craft.	Work Schedule (pending subsequent assessments)	Small negative	Small negative only for extensions beyond exclusion one)
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat). These impacts will be more significant for the cut and fill installation option then the tunneling option.	Marginal improvement is possible if the deeper intake locations prove to be less biologically productive - studies indicate otherwise. Impingement impacts that are already mitigated by engineered cove and local fish populations resistant to heavy currents and ocean surges. Overall water withdrawal or discharge rates are unchanged. Entrainment and thermal discharge impacts to aquatic life will remain largely unchanged	Marine bed area (pending subsequent assessments)	Large Negative – cut and fill Moderate Negative - tunneling	None

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new cultural or paleontological resources in these developed areas. There is some potential for marine-based impacts.	No permanent loss of onshore cultural or paleontological resources.	Limited potential for discovering resources	Small Negative	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The deepwater intake system will be submerged and present no permanent change in external profile of the facility.	Not applicable	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. There is a 1 mile exclusion zone to public activities and water craft.	The deepwater system will not significantly alter the current number of plant deliveries or operating personnel. There is a 1 mile exclusion zone to public activities and water craft.	Workforce and Level of Service (pending subsequent assessment)	Small Negative	Small Negative (if marine construction zone extends beyond exclusion zone)

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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 deepwater intake system.	Workforce (pending subsequent assessment)	Small Positive	None

Notes: Levels of Impact of Significance
Small: Environmental effects are not detectable or are minor, such that 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

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – Bureau of Land Management or Other Responsible Lead Federal Agency (Record of Decision, Right-of-Way)	Not applicable — the addition of the offshore intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the offshore intake system, either via cut-and-fill processes or tunneling, will generate significant impacts to waters of the United States and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable — the installation of the offshore intake system will generate significant impacts to waters of the United States that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the relocated offshore intake system poses significant impacts marine habitat and aquatic life and also serve to somewhat reduce operational impingement losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable — the addition of the addition of the offshore intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable — the addition of the offshore intake system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable — the addition of the offshore intake system will not require any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC will likely be the lead agency for the CEQA review process regarding the proposed offshore intake system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable — the addition of the offshore intake system 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	Applicable because of the considerable offshore and nearshore development within the coastal zone While there are no specific fatal flaws with the offshore intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the offshore intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Permit to Construct – San Luis Obispo Regional Air Pollution Control District	Not applicable — the offshore intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable — the offshore intake system will not generate any 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 offshore intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable — the offshore intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable — construction of the offshore intake system is expected to disturb little ground surfaces and so there is little potential to generate significant dust emissions. The offshore intake system itself will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Board	The offshore intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable — construction of the offshore intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable — construction of the offshore intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable — DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the offshore intake system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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– California Fish and Game Department	The installation of the offshore intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable — the addition of the relocated offshore intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable — the addition of the relocated offshore intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable — the relocated offshore intake system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	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 Environment Health Services – California Unified Program Agency	Installation of the offshore intake system could potentially require an identification number to support management or construction wastes, unless current DCPP identification will be used.	1-2 weeks	No	No

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the offshore intake system will allow for the continuing use of the existing hazardous waste ID number. There will be no 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 Environmental Health Services- California Unified Program Agency and USEPA	The addition of the offshore intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	The addition of the offshore intake system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the offshore intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the offshore intake system 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 addition of the offshore intake system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of largely offshore submerged facility may pose some jurisdictional issues, the offshore intake system will likely be addressed by 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 onsite grading during the installation of the offshore intake system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Luis Obispo County 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 Louis Obispo County Building Division	Not applicable — the addition of the offshore intake system may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable — the offshore intake elements and associated piping will be oversized.	< 1 month	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable — the offshore intake features and associated piping are will be oversized.	< 1 month	No	No
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable — the installation of the offshore intake system 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 addition of the offshore intake system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No

Table IR-1.
Environmental Permit/Approval Assessment for the Intake Relocation for Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the offshore intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table IR-2.
Offsetting Impacts for the Initial Intake Relocation
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 install wedge system.	While the offshore intake system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands. Cut and fill installation practices will be more disruptive than the tunneling option.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	Significant marine-based marine water quality impacts	Large Negative-cut and fill Moderate Negative - tunneling	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None

Table IR-2.
Offsetting Impacts for the Initial Intake Relocation
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact significance
Waste	A significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Likely increase in waste generation is expected from maintenance activities on the new velocity cap system in deeper water and the potential interaction with kelp.	Marine spoil wastes (pending subsequent assessment phase)	Moderate Negative	Moderate Negative
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the offshore intake system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters. There is a 1 mile exclusion zone that limits public access around the facility.	The offshore intake system and associated piping represent a change in land use of the marine bed and could preclude some water borne activities. There is a 1 mile exclusion zone to public activities and water craft	Need duration of work schedule	Small negative (if work zone extends beyond exclusion zone)	Small negative

Table IR-2.
Offsetting Impacts for the Initial Intake Relocation Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact significance
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat). These impacts will be more significant for the cut and fill installation option then the tunneling option.	Little or no improvement regarding impingement impacts that are already mitigated by engineered cove and local fish populations resistant to heavy currents and ocean surges. Overall water withdrawal or discharge rates are unchanged. Entrainment and thermal discharge impacts to aquatic life will remain largely unchanged	Marine bed area (pending subsequent assessment phase)	Large Negative – cut and fill Moderate Negative - tunneling	None
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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new cultural or paleontological resources in these developed areas. There is some potential for marine-based impacts.	No permanent loss of onshore cultural or paleontological resources.	Limited potential to discover resources.	Small Negative	None

Table IR-2.
Offsetting Impacts for the Initial Intake Relocation
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact significance
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The offshore intake system will be submerged and present no permanent change in external profile of the facility.	Not applicable	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. There is a 1 mile exclusion zone to public activities and water craft	The offshore system will not significantly alter the current number of plant deliveries or operating personnel. There is a 1 mile exclusion zone to public activities and water craft	Workforce - Level of service (pending subsequent assessment phase)	Small Negative	Small Negative (if marine construction zone extends beyond exclusion zone)
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 offshore intake system.	Workforce (pending subsequent assessment phase)	Small Positive	None

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the inshore fine screen intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the inshore fine screen system will generate significant impacts to waters of the United States.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the installation of the inshore fine screen intake system will generate significant impacts to waters of U.S. that likely cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	While installation of the inshore fine screen intake system may pose significant impacts to marine habitat and aquatic life, this system will reduce operational impingement losses. Entrainment impacts will be largely unchanged.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable - the addition of the addition of the inshore fine screen system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable - the addition of the inshore fine screen system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level - agl.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the inshore fine screen system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC will likely be the Lead Agency for the California Environmental Authority Act (CEQA) review process regarding the proposed inshore fine screen system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the inshore intake system 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	Applicable because of the considerable nearshore and onshore development within the coastal zone While there are no specific fatal flaws with the inshore system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the inshore fine screen system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct – San Luis Obispo Regional Air Pollution Control District	Not applicable - the inshore fine screen intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the inshore fine screen system will not generate any 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 inshore fine screen system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable - the inshore fine screen system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable – construction of the inshore fine screen system expected to disturb only limited onshore surfaces and so there is little potential to generate significant dust emissions. The inshore system, itself, will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Board	The inshore fine screen system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable – construction of the inshore fine screen system will impact a small onshore area but not significantly alter storm water management features onsite.	Not applicable - if impact <1 acre	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable – construction of the inshore fine screen system will impact a small onshore area but not significantly alter storm water management features onsite.	Not applicable – if impact <1 acre	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the inshore fine screen system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	The installation of the inshore fine screen system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable – the addition of the inshore fine screen system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable – the addition of the inshore fine screen system will impact some onshore areas which have been disturbed previously.	Limited potential to discover resources	No	No
Section 106 Review – Office of Historic Preservation	Not applicable - the inshore fine screen system will impact some onshore areas which have been disturbed previously.	Limited potential to discover resources	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Installation of the inshore fine screen system could potentially require an ID number to support management or construction wastes, unless current DCPP ID will be used.	1-2 weeks	No	No

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the inshore fine screen system will allow for the continuing use of the existing hazardous waste ID number. There will be no 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 Environmental Health Services- California Unified Program Agency and USEPA	Not applicable – the addition of the inshore fine screen system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the addition of the inshore fine screen system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the inshore fine screen system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the inshore fine screen system 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 addition of the inshore fine screen system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	The inshore fine screen system will likely be addressed by an amendment to the existing conditional use permit.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Not applicable – there will be no onsite grading during the installation of the inshore fine screen system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County 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 Louis Obispo County Building Division	Not applicable - the addition of the inshore fine screen system may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) - San Louis Obispo County Department of Environmental Health	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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the inshore fine screen elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable - the inshore fine screen elements and associated piping are not expected to not be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the installation of the inshore fine screen system 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 addition of inshore fine screen system 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

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the addition of inshore fine screen system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

**Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen Intake System
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	While the inshore system will have more screens and more pressure drop through the screens that could result in a minor reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate turbidity impacts from disruption of nearshore habitats.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	Nearshore turbidity impacts are expected during construction.	Moderate Negative	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None
Waste	Marine sediment wastes will be generated to facilitate installation of the fine screens to the inshore intake system.	Moderate increase in waste generation from maintenance activities on the mostly submerged fine screen systems.	Marine Spoil Wastes (pending subsequent phase assessment)	Moderate Negative	Moderate Negative
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the inshore system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None

Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities are primarily nearshore. However, there a 1 mile exclusion zone around the facility that already limits public access.	The reconfiguration of the inshore fine screen system represent a change in land use of some nearshore areas, but this areas are within the 1 mile exclusion zone	Not Applicable	NA	NA
Marine Ecological Resources	Construction will potentially generate temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat).	Some reduction of impingement from system that already boast natural and design mitigation attributes. Entrainment impacts could be reduced by the fine screens and associated reduce velocity field. Overall water withdrawal or discharge rates are unchanged. Thermal discharge impacts to aquatic life will remain largely unchanged	Marine bed area (pending subsequent phase assessment) Reduction of entrainment and impingement impacts	Moderate Negative	Moderate to Large 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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of onshore or nearshore cultural or paleontological resources.	Not applicable	None	None

Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen Intake System
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The inshore fine screen system will be mostly submerged and present no permanent change in external profile of the facility.	Not applicable	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 inshore fine screen system will not significantly alter the current number of plant deliveries or operating personnel. The 1 mile exclusion zone precludes any marine-based impacts.	Workforce and Level of Service (pending subsequent phase assessment)	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 may increase slightly in response to the increase cleaning and marine waste management duties associated with the inshore fine screen intake system	Workforce (pending subsequent phase assessment)	Small Positive	None

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable or are minor, such that 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.

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable — the addition of the wedge wire system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the wedge wire system, either via cut-and-fill processes or tunneling, will generate significant impacts to waters of the United States and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable — the installation of the wedge wire system will generate significant impacts to waters of the United States that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the offshore wedge wire screen system poses significant impacts marine habitat and aquatic life and also serves to reduce operational impingement losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable — the addition of the wedge wire system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable — the addition of the wedge wire screen system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable — the addition of the wedge wire system will not require any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC will likely be the Lead Agency for the CEQA review process regarding the proposed wedge wire screen system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable — the addition of the wedge wire system 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	Applicable because of the considerable offshore and nearshore development within the coastal zone. While there are no specific fatal flaws with the wedge wire system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the wedge wire system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Permit to Construct–San Luis Obispo Regional Air Pollution Control District	Not applicable-—- the wedge wire system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable — the wedge wire screen system will not generate any 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 wedge wire screen system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable — the wedge wire screen system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable — construction of the wedge wire screen system expected to disturb a limited onshore area and so there is little potential to generate significant dust emissions. The wedge wire system, itself, will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Board	The wedge wire system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable — construction of the wedge wire screen system is expected to disturb only a limited onshore area and not alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable — construction of the wedge wire screen system is expected to disturb only a limited onshore area and not alter storm water management features onsite.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable — DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the wedge wire screen system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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– California Department of Fish & Game	The installation of the wedge wire system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable — the addition of the offshore wedge wire screen system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable — the addition of the offshore wedge wire screen system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable — the offshore wedge wire screen system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	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 Environment Health Services - California Unified Program Agency	Installation of the wedge wire screen system could potentially require an identification number to support management or construction wastes, unless current DCPP identification will be used.	1-2 weeks	No	No

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the wedge wire system will allow for the continuing use of the existing hazardous waste identification number. There will be no 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 Environmental Health Services- California Unified Program Agency and USEPA	Not applicable — the addition of the wedge wire system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit – San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable — the addition of the wedge wire system is not expected to require the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services – California Unified Program Agency and USEPA	Not applicable — the addition of the wedge wire system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act– 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services – California Unified Program Agency and USEPA	Not applicable — the addition of the wedge wire system is not expected to require any new chemicals 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 addition of the wedge wire system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of largely offshore submerged facility may pose some jurisdictional issues, the wedge wire system will likely be addressed by 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 onsite grading during the installation of the offshore wedge wire screen system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Luis Obispo County 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 Obispo County Building Division	Not applicable — the addition of the wedge wire screen system may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Luis Obispo County Department of Environmental Health	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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	The wedge wire screen elements and associated piping will be oversized.	<1 month	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	The wedge screen elements and associated piping will be oversized.	<1 month	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable — the installation of the wedge wire system 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 addition of wedge wire system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of wedge wire system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
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 component, 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 install wedge system.	While the wedge wire system could result in some reduction of plant efficiency, there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands. Cut-and-fill installation practices will be more disruptive than the tunneling option.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	See Section 4.8 for related details.	Large Negative-cut and fill Moderate Negative - tunneling	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None
Waste	Significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Likely increase in waste generation from maintenance activities on the submerged modular screen systems and from kelp interactions.	Marine Spoil Wastes (pending subsequent phase assessment)	Moderate Negative	Moderate Negative

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the wedge wire system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters. However, there is a 1 mile exclusion boundary that may preclude these impacts.	The wedge wire screen modules and associated piping represent a change in land use of the marine bed and could preclude some waterborne activities if they extend beyond the 1 mile exclusion boundary	Work Schedule (pending subsequent assessment phase)	Small negative (if work extends beyond the exclusion boundary)	Small negative (if system extends beyond the exclusion boundary)
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat). These impacts will be more significant for the cut-and-fill installation option then the tunneling option.	Further reduces impingement impacts that are already mitigated by engineered cove and local fish populations resistant to heavy currents and ocean surges. Overall water withdrawal or discharge rates are unchanged. Entrainment impacts may be somewhat reduced, but thermal discharge impacts to aquatic life will remain largely unchanged.	Marine bed area (pending subsequent assessment phase)	Large Negative – cut and fill Moderate Negative - tunneling	Moderate Positive

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas. There is potential for impacts to marine-based resources.	No permanent loss of onshore cultural or paleontological resources.	Limited potential to discover resources.	Small Negative	None
Visual Resources	All construction equipment will be low profile, that is, will not extend above the height of local facility structures.	The wedge wire intake system will be submerged and will present no permanent change in external profile of the facility.	Not applicable	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 wedge wire screen system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce and Level of Service (pending subsequent assessment phase)	Small Negative	None

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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 wedge wire system.	Workforce (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact of Significance

Small: Environmental effects from not detectable or minor such that 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.

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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	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	No
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
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	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 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	Fatal Flaw
California Public Utilities Commission Approval	CPUC may share the lead agency for the CEQA with the county. The CEQA review process could include preparation of an Initial Study, followed either by a Negative Declaration or a Mitigated Negative Declaration. 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 PG&E efforts to recover the costs associated with the operational strategies.	6 - 12 months nominally	Potential	No
California Energy Commission – 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 – 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 – 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	Fatal Flaw
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 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– National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	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 – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	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
Notice of Intent– National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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 – California Department of Fish & Game	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	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 – 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	Not applicable - the operational strategies will not demand any additional land nor disturb any previously undisturbed surface.	Not applicable	NA	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 no impacts to the onsite hazardous treatment facility (oil separation unit).	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	Fatal Flaw
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 Obispo 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
Emergency Planning and Community Right-to-Know Act – 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

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 Obispo 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 Obispo 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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	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)	The equipment related to the operational strategies will probably not prove to be oversized.	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.	Not applicable	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.	Not applicable	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.	Some marginal improvement in reducing marine resource losses.	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.	Not applicable	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.	Not applicable	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.	Not applicable	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 that 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.

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – Bureau of Land Management (BLM) or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the substrate filtering intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the substrate filtering intake system, either via cut and fill processes or tunneling, will generate significant impacts to waters of U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	The Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable - the installation of the substrate filtering intake system will generate significant impacts to waters of U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the substrate filtering intake system will pose significant impacts marine habitat and aquatic life and also serve to reduce operational impingement and entrainment losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable - the addition of the addition of the substrate filtering intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable - the addition of the substrate filtering intake system will not demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable - the addition of the substrate filtering intake system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC will likely be the Lead Agency for the CEQA review process regarding the proposed substrate filtering intake system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the substrate filtering intake system 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	Applicable because of the considerable offshore and nearshore development within the coastal zone. While there are no specific fatal flaws with the substrate filtering intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the substrate filtering intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct – San Luis Obispo Regional Air Pollution Control District	Not applicable - the substrate filtering intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Luis Obispo Air Pollution Control District	Not applicable - the substrate filtering intake system will not generate any 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 substrate filtering intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable - the substrate filtering intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable – construction of the substrate filtering intake system expected to disturb little of ground surfaces and so there is little potential to generate significant dust emissions. The substrate filtering intake system, itself, will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Water Resources Board	The substrate filtering intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable – construction of the substrate filtering intake system is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable – construction of the substrate filtering intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the substrate filtering intake system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan– National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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– California Department of Fish & Game	The installation of the substrate filtering intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable – the addition of the substrate filtering intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable – the addition of the substrate filtering intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable - the substrate filtering intake system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA
Notification of Waste Activity – Resource Conservation and Recovery Act Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Installation of the substrate filtering intake system could potentially require an ID number to support management or construction wastes, unless current DCPP ID will be used.	1-2 weeks	No	No

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 addition of the substrate filtering intake system will allow for the continuing use of the existing hazardous waste ID number. There will be no 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 Environmental Health Services- California Unified Program Agency and USEPA	Not applicable – the addition of the substrate filtering intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the addition of the substrate filtering intake system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the substrate filtering intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the substrate filtering intake system 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 addition of the substrate filtering intake system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of this offshore submerged facility may pose some jurisdictional issues, the substrate filtering intake system will likely be addressed by 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 onsite grading during the installation of the offshore substrate filtering intake system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County 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 Louis Obispo County Building Division	Not applicable - the addition of the substrate filtering intake system may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) - San Louis Obispo County Department of Environmental Health	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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the substrate filtering intake elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable - the substrate elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the installation of the substrate filtering intake system is not expected to require local power poles.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	The addition of substrate filtering intake system 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 addition of substrate filtering intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table SWS-2. Offsetting Impacts for the Substrate Filtering Intake System 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 install substrate filtering system.	While the substrate filtering system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands. Cut and fill installation practices will be more disruptive than the tunneling option.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	See Section 4.8 for related details.	Large Negative- cut and fill Moderate Negative - tunneling	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None

Table SWS-2. Offsetting Impacts for the Substrate Filtering Intake System Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Waste	A significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Likely increase in waste generation is expected from maintenance activities on the substrate filtering system (seabed clearing activities).	Marine Spoil Wastes (pending subsequent phase of assessment)	Moderate Negative	Moderate Negative
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the substrate filtering system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters. However, there is 1 mile exclusion boundary y to public access that could preclude this impact.	The substrate filtering system and associated piping represent a change in land use of the marine bed and could preclude some waterborne activities – if they extend beyond the exclusion zone	Work schedule (pending subsequent assessment)	Small negative (if work extends beyond the exclusion zone)	Small negative (if system extends beyond the exclusion boundary)
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat). These impacts will be more significant for the cut and fill installation option then the tunneling option.	Further reduces impingement impacts that are already mitigated by engineered cove and local fish populations resistant to heavy currents and ocean surges. Also reduces entrainment losses because of the effective seabed filter. Overall water withdrawal or discharge rates are unchanged.	Disturbed area (pending subsequent assessment) Significant reductions of impingement and entrainment losses	Large Negative – cut and fill Moderate Negative - tunneling	Large Positive

Table SWS-2. Offsetting Impacts for the Substrate Filtering Intake System Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new onshore cultural or paleontological resources in these developed areas. However, there is potential for impacts to marine-related resources.	No permanent loss of onshore cultural or paleontological resources.	Limited potential to discover resources.	Small Negative	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The substrate filtering system will be submerged and present no permanent change in external profile of the facility.	Not applicable	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 exclusion zone could preclude construction-based marine impacts.	The substrate filtering system will not significantly alter the current number of plant deliveries or operating personnel. System could extend beyond the exclusion zone posing marine transportation impacts.	Workforce, Level of Service (pending subsequent assessment)	Small Negative	Small Negative (if system extends beyond exclusion zone)

Table SWS-2. Offsetting Impacts for the Substrate Filtering Intake System Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
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 substrate filtering system.	Workforce (pending subsequent assessment)	Small Positive	None

Notes: Levels of Impact of Significance

Small: Environmental effects are not detectable to minor, such that 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.

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – Bureau of Land Management or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable — the addition of the variable speed cooling water pump system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable — the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable — the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable — the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable — the addition of the variable speed cooling water pump water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable — the addition of the variable speed cooling water pump system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable — the addition of the variable speed cooling water pump system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable — the addition of the variable speed cooling water pump system will not require any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	CPUC will likely be the lead agency for the CEQA with the county. The CEQA review process could include preparation of an Initial Study, followed either by a Negative Declaration or a Mitigated Negative Declaration. Alternatively, the county could influence the CEQA process to follow the Environmental Impact Report route to encourage the alternative review of various cooling system options. This decision from this process will, regardless, be involved with PG&E efforts to recover the costs associated with the variable speed cooling water pump system.	6 - 12 months nominally	Potential	No
California Energy Commission – Final Decision	Not applicable — the addition of the variable speed pump 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 variable speed cooling water pump system will not demand any 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	Not applicable — the variable speed cooling water pump system will not involve any work in the marine environment.	Not applicable	NA	NA
Regional Pollution Control District Permit to Construct (ATC, Authority to Construct) – San Luis Obispo Regional Air Pollution Control District	Not applicable — the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate (PTC, Permit to Operate) – San Luis Obispo Air Pollution Control District	Not applicable — the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable — the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable — the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable — construction of the variable speed cooling water pump system is not expected to disturb ground surfaces and so is not expected to generate any significant supplemental dust emissions. The pumping system will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board and State Resources Board	While the variable speed cooling water pumping system will likely provide more operational flexibility regarding water withdrawal rates, it will not change the peak water withdrawal rates, nor change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board	Not applicable — construction of the variable speed cooling water pump system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Water Quality Control Board	Not applicable — construction of the variable speed cooling water pump system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coastal Regional Water Quality Control Board	Not applicable — DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the variable speed cooling water pump system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board	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– California Department of Fish & Game	Not applicable — the addition of the variable speed cooling water pump water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable — the addition of the variable speed cooling water pump will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – Central Coast Regional Water Quality Control Board	Not applicable — the addition of the variable speed cooling water pump will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable — the variable speed cooling water pump system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA
Notification of Waste Activity – Resource Conservation and Recovery Act Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Luis Obispo County Department of Environmental Health Services – California Unified Program Agency	Installation of the pumping system could potentially require an identification number to support management or construction wastes, unless current DCPP identification will be used.	1–2 weeks	No	No

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity - Resource Conservation and Recovery Act (RCRA) Hazardous Waste Identification Number (Small Quantity Generator) – Operation –Department of Toxic Substance Control, USEPA, San Luis Obispo County Department of Environmental Health Services – California Unified Program Agency	Not applicable — the addition of the pumping system will allow for the continuing use of the existing hazardous waste identification number. There will be no impact to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
Spill Prevention, Control, and Countermeasure Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo County Department of Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable — the addition of the pumping system 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 addition of the pumping system is not expected to require the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Department of Environmental Health Services – California Unified Program Agency and USEPA	Not applicable — the addition of the pumping system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 - San Luis Obispo County Department of Environmental Health Services – California Unified Program Agency and USEPA	Not applicable — the addition of the pumping system is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, and 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Luis Obispo County Department of Planning and Buildings	Not applicable — the addition of the pumping system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of an internal pumping system in an existing building 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 the installation of system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Luis Obispo County 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 Obispo County Department of Planning and Building	Not applicable — the addition of the variable speed cooling water pump system may demand an individual or set of county building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Luis Obispo 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
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable — the variable speed pump system will probably not prove to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable — variable speed pump system will probably not prove to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable — the installation of the variable speed pumping system is not expected to require local power poles.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	The addition of variable speed pump 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 addition of variable speed pumps will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems
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 install pumping system.	While the variable speed pump system could result in some plant efficiency gains during lower load operating scenario, 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.	During periods of reduced power output, the variable cooling water pump system will withdraw less saltwater that ultimately contributes to local thermal impacts from the reduced cooling water discharge.	Minimal reduction in water withdrawal rates.	None	Small Positive
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support operations.	Not applicable	None	None
Waste	Constructions-related waste will be generated during the outage. Most of these wastes will be recyclable metal that will not impact offsite disposal facilities.	No significant increase in waste generation during operation.	Insignificant temporary increase in construction wastes and some metal recyclables	Small Negative	None

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems for the 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 are inside existing buildings.	Operational noise levels are expected to be largely unchanged as a result of the new pumping system.	Not applicable	None	None
Land Use	Construction activities are largely confined to previously disturbance lands and existing structures.	Pumping system resides in existing structures, so there are no permanent changes in land use.	Not applicable	None	None
Marine Ecological Resources	No new marine-based construction will be needed to install the variable speed pumping system.	During periods of reduced power output, the variable cooling water pump system will withdraw less saltwater resulting in a parallel and equivalent reduction of impingement and entrainment impacts and a coincident reduction of local thermal impacts from the reduced cooling water discharge.	Minimal reduction of water withdrawals and associated marine resource impacts.	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.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed 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.	Not applicable	None	None

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems for the Diablo Canyon Power Plant *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The variable cooling water pump system will be contained within an existing building and will present no permanent change in external profile of the facility.	Not applicable	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 new pumping system will not significantly alter the current number of plant deliveries or operating personnel.	Level of Service Impacts (pending later 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 new pumping system.	Employment Levels (pending later phase)	Small Positive	None

Notes: Levels of Impact of Significance
Small: Environmental effects are from not detectable to minor, such that 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.