Prepared for

PG&E

and the
State Water Resources Control Board
Nuclear Review Committee

Independent Third-Party Interim Technical Assessment

for the

Inshore Fine Mesh Screens for Diablo Canyon Power Plant

Prepared by

BECHTEL

Bechtel Power Corporation

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Revision	Date	Affected Sections
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List of Abbreviations and Acronyms

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

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1. Executive Summary

This study summarizes the findings of the first phase of a detailed evaluation to assess viability of adding a fine mesh screening system of the initial intake system to the once-through cooling for the Diablo Canyon Power Plant (DCPP). Replacing the current screening system with fine mesh screens is one of the suggested technologies in support of the Nuclear Review Committee's initiative to identify strategies to implement the California *Statewide Policy on the Use of Coast and Estuarine Waters for Power Plant Cooling*. This strategy would comply with the Section 316(b), *California Once-Through-Cooling Policy*, Phase II rules.

The existing intake system already boasts a low impingement biomass rate, which is related to turbulent local water conditions and protected nature of the intake. However, this evaluation concludes that inshore fine mesh screens technology can be implemented through modifications to the existing DCPP shoreline pump intake. The existing screen system would be replaced with a dual flow screens 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 installing a fish collection and return system on each traveling water screen that rotates continuously, with the fish return pipeline routed to the open sea. Operationally, this provides a significant positive improvement to the existing inshore screening system.

Even though this technology does not comply with the maximum 0.5 fps through screen velocity described in the Section 316(b), *California Once-Through Cooling Policy*, Phase II rule, the inclusion of fish collection/return system significantly improve impingement mortality and entrainment reduction and provides the mitigation measures that can make it aligned to comply with the once-through cooling policy requirements. Thus this technology should be a candidate for further evaluation in the pending Phase II assessment.

Permitting this change is expected to be aligned with the California Environmental Quality Act (CEQA)/Environmental Impact Report review process. Despite this improvement regarding entrainment-related losses, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or regulatory criteria that would preclude this technology option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process, which would preclude the inshore fine screen intake system from further consideration expected to be contentious and have lengthy processes that will be aligned with the CEQA/Environmental Impact Report review process. There were no fatal flaws in the associated regulatory review process, which would preclude the inshore fine screen intake screen system from further consideration.

The addition of duel flow fine mesh screens along with a fish return system has been reviewed against each of the Phase 1 criterion and the results are summarized below. The overall finding is that although this technology is feasible, there are several significant technical and operational challenges. These key challenges include the need to add the duel flow screens and fish return system to the existing pumphouse, and the complexities of the construction approach. These challenges are challenges that can be overcome, that is, they do not represent fatal flaws at this stage of the assessment.

Criterion	Status
External Approval and Permitting	No fatal flaws
Impingement/Entrainment Design	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 system.
Environmental Offsets	No fatal flaws.
First-of-Kind-to-Scale	No fatal flaws.
Operability of General Site Conditions	No fatal flaws.
Seismic and Tsunami Issues	No fatal flaws.
Structure and Construction	No fatal flaws.
Maintenance	No fatal flaws.
Conclusion	Technology is a candidate for Phase 2 review.

2. Background and Introduction

2.1 Purpose/Scope of Study

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

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

2.2 Regulatory History

2.2.1 Federal

The U.S. Environmental Protection Agency (USEPA) has proposed standards to meet its obligations under the Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. Specifically, Section 316(b) requires National Pollutant Discharge Elimination System (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, which 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 shell fish through impingement and entrainment. Impingement occurs when fish and other aquatic life are trapped against the screens when cooling water is withdrawn resulting in

injury and often death. Entrainment occurs when these organisms are drawn into the facility where they are exposed to high temperatures and pressures—again resulting in injury and death. (USEPA, March 2011)

In response to a consent decree with environmental organizations, the USEPA divided 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 rules, issued in February 2004. Since then the rule has been challenged, remanded, suspended, and re-proposed. The current proposed version of the rule dictates that all existing facilities that withdraw more than 2 million gallons per day (mgd) of water from waters of the U.S. and use at least 25 percent of the water they withdraw exclusively for cooling purposes would be subject to:

- Upper limit on the number of fish killed because of impingement and determining the technology necessary to comply with this limit, or
- Reduce the intake velocity to 0.5 feet/second (through-screen) or below, which would allow most fish to avoid impingement.

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

The Section 316(b) Phase II final rule is expected to be issued on July 27, 2012. When the final rule becomes 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 *Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through Cooling) Policy* became effective on October 1, 2010. This Policy established statewide technology-based requirements to significantly reduce the adverse impacts to aquatic life from once-through- cooling. Closed-cycle wet cooling has been selected as best technology available.

Affected facilities, including DCPP, are expected to:

- Reduce intake flow to a level commensurate with that attainable with a closed cycle wet cooling system and reduce through screen velocity to 0.5 feet/second or below (through screen) – Track 1
- Reduce impacts to aquatic life comparably by other means – Track 2

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

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

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

DCPP operates a cooling water intake structure to provide cooling water to the once through circulating water system of Units 1 and 2. Each unit's water withdrawal rate is nominally 867,000 gpm or 1,248 mgd. Cooling water is withdrawn through a shoreline intake structure in a cove partially protected with man-made breakwaters. The inlet structure includes a set of inclined bar racks and traveling screens. A concrete curtain wall extends 7.75 feet below mean sea level to keep out floating debris. Incoming cooling water for the normal circulating water system 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. The through screen velocity is approximately 1.95 fps. 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, 2009) through a grinder. In addition, each unit has two auxiliary saltwater trains (one duty and one standby) that perform safety-related functions and each train is served with one auxiliary saltwater pump, rated at 11,000 gpm (DCPP, May 2009). The auxiliary saltwater pumps for each unit are housed in separate pump bays located near the center of the intake structure, and are serviced by a common 5-foot-wide traveling water screen.

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

2.3 Screening Process (A/B Criteria)

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

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

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

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

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

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

3. Technology Description

3.1 General Site and Intake Descriptions

3.1.1 Land and Sea Physical Conditions

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

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

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

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

3.1.2 Existing Shoreline Intake Description

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

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

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

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

3.2 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 reports 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, DCPP 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 organism 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 cost of DCPP modification or operational changes are wholly disproportionate to the benefit to be gained.”(PG&E, 2009).

DCPP 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 DCPP considers mitigation to be not necessary. Therefore, use of once-through cooling at the 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 DCPP to be small.

3.3 General Technology Description

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 (a) convert the existing flow through screens to dual flow screens, (b) 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 (c) 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*

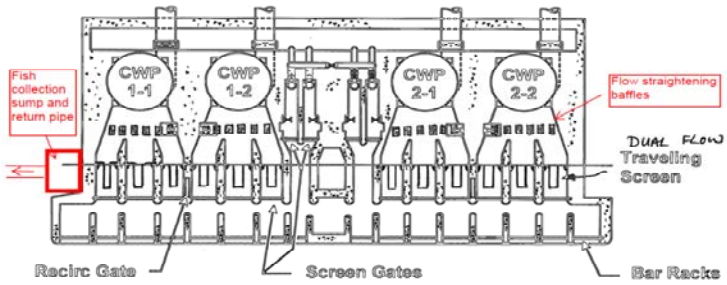

Figure IFMS-2. *Converting Existing Flow-Through Traveling Screen to Fine Mesh Dual-Flow Traveling Screen, with Fish Collection Buckets and Return Systems*

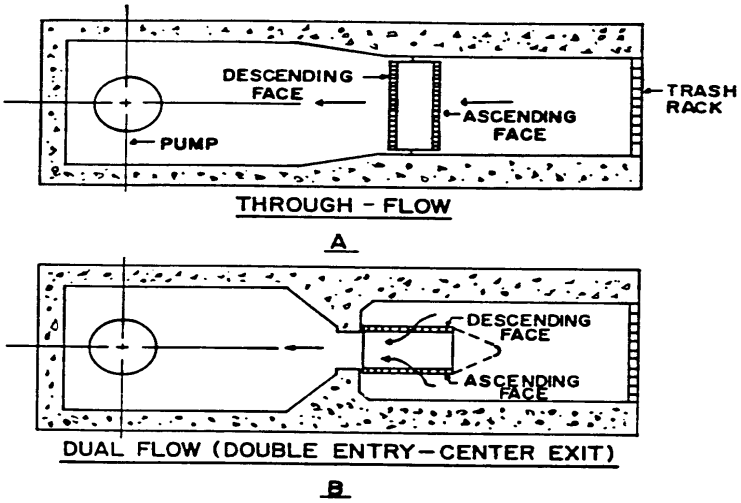

Figure IFMS-3. *Comparison of Through-Flow Screen vs. Dual Flow Screen*

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 feet per second, 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 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 organism 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 ft 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.

4. Criterion Evaluation

4.1 External Approval and Permitting – Inshore Fine Screen Intake System

4.1.1 General Discussion

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of an inshore (onshore) fine screen intake system.

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). The applicability of each permit/approval to the proposed inshore fine screen option 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 that 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 inshore fine screen system 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 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 (USACE)
- California Public Utility Commission (CPUC)
- California Coastal Commission (CCC)
- California State Lands Commission
- State Water Resources Control Board (SWRCB)
- Central Coast Regional Water Quality Control Board (CCRWQCB)
- San Luis Obispo Air Pollution Control District (APCD)
- San Luis Obispo County

The following sections discuss the relevant key permitting/approval processes for the inshore fine screen mesh technology. A summary is provided in Table IFMS-1. This table lists the applicable permits and approvals, determines the critical path review processes and most importantly, highlights those processes that may result in a fatal flaw.

4.1.2.1 Inshore Fine Screen Intake System

The inshore fine screen intake system involves modifying the existing inshore intake system to add fine mesh screen panels to new dual flow screens and install a fish collection and return system.

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 primary on impacts to waters of the United States and waterborne navigation. The inshore fine screen system will involve nearshore construction impacts, which will impact USACE jurisdictional waters.

For minor impacts, the USACE has established a general permit program (Nationwide Permit) for a host of less significant work processes involving waters of the United States. The significant marine work associated with this cooling system option may preclude any Nationwide Permit permitting process. DCPP would then be faced with securing the more complex individual Section 404/10 permit.

While Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have goal to issue an individual Section 404 permit within 120 days of deeming the associated application complete (Lambert, 2012). This period is a goal, not a statutory commitment. Consequently, in many cases this goal is not realized. These delays are often associated with the mandated consulting processes that need to be pursued with the State Historic Preservation Office, U.S. Fish and Wildlife Service, or National Marine Fisheries Service. In other cases there are extensions of public notice periods or scheduling complications for the public hearing. The applicant for the Section 404/10 permit has to directly pursue consultations with 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 under-staffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and contentious situations, the permitting process can extend to 1 to 2 years. Hence, the USACE permits are often characterized as the critical path permitting process. Given the significant new marine work associated with this cooling technology option, it is likely that the Section 404 permit will represent a critical path item to the completion of permitting.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any specific barriers or fatal flaws regarding the Section 404 permitting process for inshore fine screen intake system.

California Public Utility Commission

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

The proposed addition of fine screen panels may trigger preparation of Environmental Impact Report. The Environmental Impact Report 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 Environmental Impact Report will also be used by other state agencies to support their respective review and approval processes.

Following finalization of the Environmental Impact Report, 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 CPUC-sponsored review process and decision regarding cost recovery will likely be a lengthy, complex and contentious process, there are no definitive environmental barriers that preclude successfully completion of the CEQA review and a positive record of decision.

California Coastal Commission

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

The CCC representatives (Detmer 2012 and Luster 2012) indicated that the Commission recognized that there were no great options to the existing once-through cooling system at DCPP. Indeed, the CCC believes that almost all of the cooling system technology replacement options present some sort of negative impact. Given that basis, the CCC may consider options, which may present additional onshore or different offshore 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 the inshore fine screen intake system.

Despite the lack of obvious fatal flaws, the inshore system will certainly include nearshore construction efforts, so the CCC will be focused on the deleterious construction impacts to local marine resources (for example, local fish, shellfish, and vegetation) and the potentially offsetting positive benefits associated with reducing operational impingement impacts. Visual impacts in the coastal zone, a typical key CCC subject area, is not expected to be an important factor for this nearshore low profile system. Entrainment or thermal discharge impact matters are also expected to be sideline issues, since they remain largely unchanged with this cooling system.

The CCC consideration of these issues and their follow-on approval process is mostly aligned with the CEQA process. That is, any application for a Coastal Development Permit will be dependent on information generated by associated Environmental Impact Report development process. Consequently, the CCC permit review process will also be aligned 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.

- **Environmental Impact Report/CEQA Process** – applicable for work that could potentially generate significant environmental impacts, uses heavy construction equipment, and/or will continue over a significant time 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 inshore fine screen technology 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 Environmental Impact Report/CEQA review process.

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 a year is a distinct possibility.

Despite this expected lengthy review process, the nearshore marine work in subaqueous lands does not appear to offer any specific impacts or regulatory considerations, which represent fatal flaws.

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

While the SWRCB has overall permit authority for California's two active nuclear power stations, the CCRWQCB has the follow-on inspection and enforcement role for the issue permits. For DCPP, the SWRCB expects to modify the existing NPDES permit in support of the proposed inshore fine screen intake system. The lack of significant disruption to local land surfaces is expected to negate any need for new waste discharge requirements permit for construction impacts to jurisdictional streambed areas and possibly avoid the need to seek coverage under the general storm water permit for construction activity.

Inshore fine screen intake system construction activities will potentially generate significant, temporary water quality and marine habitat (intertidal and sub-tidal) impacts. Adding the fine screen panels will likely result in significant localized turbidity impacts and some temporary and permanent loss of the biologically productive nearshore marine habitat area.

Operationally, while the inshore fine screen intake system may reduce entrainment influences relative to the existing traveling screen system, the additional screens will not, by itself, reduce the overall water withdrawal or discharge rates. Consequently, the entrainment will be reduced but the thermal discharge impacts to aquatic life will remain largely unchanged.

Given that the cooling water withdrawal and discharge rates will remain essentially unchanged any revisions to the current DCPP NPDES permit will be limited to compliance provisions of Section 316(b), *California Once-Through Cooling Policy*, Phase II requirements. There will ostensibly be no changes to the current water treatment system, as this option is still a once-through system that now includes a more robust fine screen system.

Both the SWRCB and CCRWQCB representatives (Jauregui, 2012 and Morris, 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 the inshore fine screen 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 Section 316(b), *California Once-Through Cooling Policy*, Phase II rules (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cooling cycle system). The inshore fine screen intake system-related improvements regarding entrainment impacts will fall well short of closed-cycle cooling attributes.

The SWRCB is ultimately a political body (9 individuals), whose members are interested in reviewing as much information/evidence as possible from the applicant and 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 inshore fine screen system.

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 (closed cooling cycle systems), air quality permits/approvals are not expected to play an appreciable role for the inshore fine screen system—a system that is not expected to generate any additional operational air emissions.

San Luis Obispo County

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

The county recently completed a CEQA/conditional use permit review process for the DCPP steam generator replacement project (Hostetter, 2012). The county, along with 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 inshore fine screen intake system's 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 inshore system.

The county also explained (Hostetter, 2012) that 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 inshore fine screen 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 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 inshore fine screen intake system may temporarily and permanently disturb nearshore sensitive marine habitat and reduce impingement and entrainment impacts to local fish and shellfish. 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 this option primarily involves nearshore work and underwater facilities, it is unlikely the cultural or historic resources (land-based) will be impacted.

Installation of these largely submerged screening panels inside the existing pump house will not alter the overall profile of the DCPP facility and certainly not require significantly tall or large construction equipment. These considerations will preclude significant interactions with California Department of Transportation (Caltrans) (roadway crossings, encroachments, oversized vehicles) and the Federal Aviation Administra-

tion (FAA), whose focus would be limited to aviation obstruction impacts posed by tall new permanent or temporary features (less than 200 feet above ground level or agl).

Finally, the California Energy Commission (CEC) will be largely excluded from the permitting processes primarily because inshore fine screen intake systems will not boost the current power levels of the DCPP facility, let alone reach the 50 MW threshold, which would mandate CEC review.

4.1.2.2 Summary

The external approval and permitting assessment for the inshore fine screen intake system identified a list of potentially applicable federal, state and local permits and approvals that focused on its significant impacts to the 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, NPDES permit modification will represent the primary regulatory challenges.

These permits are all expected to be contentious and have lengthy review processes that are aligned with the CEQA/Environmental Impact Report review process Despite this improvement regarding entrainment-related losses, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or regulatory criteria that would preclude this technology option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process, which would preclude the inshore fine screen intake system 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 inshore fine screen system. This critical path process does not represent a barrier to development of this cooling technology system.

4.2 Impingement/Entrainment Design

4.2.1 General Discussion

The design of inshore fine mesh screen technology affects impingement and entrainment reduction primarily in three ways: (a) 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; (b) 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 organism and fish and then wash them off the screen and collection buckets; and (c) return the collected fish and larval organism to the source water via the return piping with adequate water depth.

4.2.2 Detailed Evaluation

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 one percent for striped bass to 96 percent for blu-

egill 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).

Salem Generating Station on 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 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 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 substantial survival rate of impinged organism, 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 situation 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 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 ups to 40 ft per minute. This is a major improvement over 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). Even through the approach velocity toward the dual flow screens are 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 is 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 maintain an adequate water depth 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 Section 316(b), *California Once-Through Cooling Policy*, Phase II rule. The inclusion of 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 II of the study.

4.3 4.3 Offsetting Environmental Impacts –Inshore Fine Screen Intake

4.3.1 General Discussion

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, multi-disciplinary 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 with the construction and operation of inshore fine screen intake system from a broad range of environmental evaluation criteria.

4.3.2 Detailed Discussion

The following sections evaluate the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic issues associated with construction and operation of the inshore fine screen 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 (DCPP, 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 and 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 the Table IFMS-2.

Air

The air quality impacts associated with installation of the inshore fine screen intake system are small given that the primarily marine-based nature of the associated construction activities. There will be little or no opportunity to generate fugitive dust from land disturbance activities, as the primary activity will involve marine work. Some additional vehicle-related air emissions can be expected from the small number of outage workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment will be unnecessary, but there may be some emission sources on temporary offshore platforms or barges. Construction supplies and inshore fine screen intake and piping-related equipment deliveries may be significant in the early phases of construction.

The inshore fine screen system is not expected to offer any improvements in DCPP's overall plant efficiency. The additional screen features may serve to increase pressure drop across the fine screens, which could have a minor impact on overall plant efficiency. However, there will be no significant change in DCPP power generation rates, nor any related variation in greenhouse gas or other pollutant emissions from replacement fossil power sources.

Surface Water

Inshore system construction activities are primarily marine-based and they have the potential to generate significant water quality impacts. Construction of the inshore fine screen system will result in localized turbidity impacts from disruption of the local seabed—a moderate negative impact. These construction efforts are not expected to result in any land-based disturbance or storm water-related impacts.

The inshore fine screen intake system will not change the overall cooling water withdrawal or discharge rates

Groundwater

Given the primarily marine construction environment associated with the installation of the inshore fine screen intake system, no significant additional groundwater resources will be needed.

The inshore fine screen intake system is not expected to require any additional groundwater resources.

Waste

Constructions-related waste, including marine bed sediment and recyclable metals associated with surplus piping and the inshore fine screen system, will be generated during the outage. Marine dredge spoil volumes

could be considerable. The final disposition of these materials has not been determined. The majority of the piping and related wastes are expected to have salvage value and therefore, not represent a burden to offsite disposal facilities. Disposal of the marine sediment, whether directed to an onsite or offsite disposal area, will represent a moderate construction negative impact.

Physical inspection and cleaning of this intake system, as part of the maintenance program, is likely to generate additional biological wastes. Collection and disposal of these marine wastes, therefore, can be categorized a moderate operational negative impact.

Noise

The County of 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 inshore fine screen intake system are not expected to be significant for land-based locations, since the primary work areas will be in a nearshore location within the existing intake structure. Buffer areas around marine 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.

Operational noise levels are expected to be largely unchanged following installation of the inshore fine screen system.

Land Use

Construction activities associated with this system are primarily nearshore for the fish return line and onshore within the pump house, and these activities could temporarily preclude normal recreational activities in waters in the immediate construction areas. As mentioned above, buffer zones will be created and maintained during the course of construction for the safety of the workforce and public. The potential temporary restriction of normal public access in these marine areas represents a small negative impact for this cooling technology option.

The inshore fine screen system may represent a change in land use in areas occupied by the existing inshore intake system. The inshore location of the intake is not expected to impact waterborne traffic. Given these impacts, operation of this underwater system is expected to offer a small term negative impact.

Marine Ecological Resources

Reconfiguring the existing inshore intake system to include fine screen elements will result in localized turbidity impacts and some temporary and permanent loss of the biological productive nearshore marine habitat area – a moderate negative impact.

While the enhanced screening of the inshore intake system will reduce the impingement impacts over the existing once-through system that boasts the lowest impingement biomass rate already (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 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. The entrainment impacts, while mostly related to the water withdrawal rates, could be significantly reduced by the fine screen system. Consequently, this system will, operationally, offer a moderate to high positive impact relative to the current condition.

Terrestrial Ecological Resources

Construction activities associated with the inshore fine screen intake system are primarily marine-based and consequently present little or no impact to land areas. Thus, there will be no construction impacts to terrestrial natural habitat areas or areas with significant ecological value or sensitivity. Operation of the inshore system will similarly present no new threat to these resource areas.

Cultural and Paleontological Resources

Since installation of the inshore fine screens will be confined to subaqueous lands, there is little or no potential to discover new cultural or paleontological resources in these developed areas. Operation of this system will similarly pose no new threat to cultural or paleontological resources.

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 inshore fine screen intake system will be mostly submerged and present no permanent change in external profile of the facility. The fish return piping will be buried and therefore present no visual impact.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during the 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 inshore fine screen intake will increase maintenance and service requirements, but any related maintenance staff increases are expected to be minimal. Therefore, there are limited or no operational transportation impacts for this system.

Socioeconomic Issues

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

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

4.3.3 Summary

Table IFMS-2 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the inshore fine screen system. The construction impacts could be characterized as having moderate negative impact significance in that some of this work may be conducted on previously disturbed subaqueous land. Construction practices will involve onshore and marine work related to the installation of fish return piping and changing the screen system to fine mesh dual flow type within the pump house.

Operationally, there is significant positive impact related to adding fine screens the existing inshore screening system. The existing intake system already boasts a low impingement biomass rate, which is related to turbulent local water conditions and protected nature of the intake.

There is no coincident reduction of cooling water withdrawals, so no change in thermal discharge impacts. Collectively, there are some moderate positive operational environmental attributes with the inshore fine screen system to offset the moderate construction-related negative impact associated with the disruption of additional marine habitats and localized water quality degradation

4.4 First-of-a-Kind

4.4.1 General Discussion

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 Band (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, which can fit this space, the 0.5 millimeter mesh size is unworkable. The 1 to 2 millimeters mesh openings are considered to be the more reliable option.

4.4.2 Detailed Evaluation

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 Band 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 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 carry over 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 conti-

nuous screen rotation at speeds up to 40 feet per minute. This is routinely done in the industry to counter the high debris loading conditions.

4.5 Operability General Site Conditions

4.5.1 General Discussion

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 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.

4.5.2 Detailed Evaluation

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 primarily is 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 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 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 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.

4.6 Seismic and Tsunami Issues

4.6.1 General Discussion

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.

4.6.2 Detailed Evaluation

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 attack.

- The fish return piping back to the sea will be covered with rock armor for stability and protection against wave forces.

4.7 Structural

The majority 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.

4.8 Construction

4.8.1 General Discussion

The major construction activities for using this technology include the following:

- Excavate a trench and install fish return piping.

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

- Install 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. Note that the auxiliary saltwater pumps will operate continuously.

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

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

- Install the fish return system.

- Install new screen drive.

- Repeat same steps for the other unit.

4.8.2 Detailed Evaluation

With the modifications planned for the intake structure, it is expected that at least one unit will be shutdown 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 attack.

4.9 Maintenance

There are considerably greater operation and maintenance requirements associated with use of fine mesh dual flow screen, 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.

5. Conclusion

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 Section 316(b), *California Once-Through Cooling Policy*, Phase II rule, the inclusion of fish collection/return system however, provides the additional mitigation measures that can make it aligned to comply 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 II assessment.

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USEPA, National Pollution Discharge Elimination System-Cooling Water Intake Structures at Existing Facilities and Phase I facilities, Proposed Rule, 40 CFR Parts 122 and 125, April 20, 2011.

USEPA, Proposed Regulations to Establish Requirements for Existing Cooling Water Intake Structures at Existing Facilities, EPA – 820-F-11-002, March 2011.

Von Langen, P., Central Coast Regional Water Quality Control Board (personal communication April 16, 2012)

Willey, G., San Luis Obispo Air Pollution Control District (personal communication, April 19, 2012)

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 (USACE)	Installation of the inshore fine screen system will generate significant impacts to waters of U.S.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers (USACE) & Regional Quality Control Board (RWQCB)	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	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 (FAA), 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 (BLM) 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 Utility Commission (CPUC) 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 (CEC) – 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 contentious 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 contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct (ATC) – 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 (PTO) – 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 little or ground 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 (CCRWQCB) 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 (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board (CCRWQCB)	Not applicable – construction of the inshore fine screen system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable – construction of the inshore fine screen system is not expected to disturb ground surfaces or alter storm water management features onsite.	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
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the inshore fine screen system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Department of Fish & Game (CDFG)	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 (CDFG)	Not applicable – the addition of the inshore fine screen system will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements (WDR) – Central Coast Regional Water Quality Control Board	Not applicable – the addition of the inshore fine screen system will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation (OHP)	Not applicable - the inshore fine screen system will not demand any additional land nor generate any new surface disturbances.	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
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
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 not impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo 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

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
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the 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
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 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 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

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
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 expected to not be oversized.	Not applicable	NA	NA
Resource Conservation (RC) Land Use Management Approval	Not applicable - while local municipality rules may supersede this regional land use//watershed protection-related project approval process, this is not the case for DCPP.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the 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
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 Offshore 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 outage to install wedge system.	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 be remain largely unchanged.	Not applicable	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 Offshore 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 and they may temporarily preclude normal recreational activities in nearby waters.	The reconfiguration of the inshore fine screen system represent a change in land use of some nearshore areas, but will not preclude waterborne activities.	Work schedule (pending subsequent phase assessment)	Small negative	Small negative
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)	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 cultural or paleontological resources.	Not applicable	None	None

Table IFMS-2.
Offsetting Impacts for the Offshore 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.	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.