



Prepared for



SOUTHERN CALIFORNIA
EDISON
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and the
*State Water Resources Control Board
Nuclear Review Committee*

Independent Third-Party
Interim Technical Assessment

for the
**Operational Strategies to Reduce Impingement and Entrainment
for San Onofre Nuclear Generating Station**

Prepared by



Bechtel Power Corporation

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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
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
SDRWQCB	San Diego Regional Water Quality Control Board
SPCC	Spill Prevention Control and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Council Board
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USMC	U.S. Marine Corps
WDR	Waste Discharge Requirement

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1. Executive Summary

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

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

- Cooling Water Flow Rate Reduction
- Continuous Operation of Fish-Handling System
- Fish Deterrence Systems

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

For the existing fish-handling bucket to operate continuously, it will not result in any improvement in entrainment reduction and it is anticipated any attainable impingement reduction benefits would be incremental.

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

Note that, supplementing the existing fish-handling system, modifications on adding fish collection and return system to each individual traveling water screen and changing screen panel to fine mesh screens are covered in the inshore mechanical fine mesh technology report and therefore they are not covered here.

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



Criterion	Status
External Approval and Permitting	No fatal flaws
Impingement/Entrainment Design	Cannot satisfy 316(b) California Once-Through Cooling Policy Criteria Phase II requirements.
Environmental Offsets	Weak overall net positive benefit
First-of-Kind-to-Scale	Not conducted
Operability of General Site Conditions	Not conducted
Seismic and Tsunami Issues	Not conducted
Structure and Construction	Not conducted
Maintenance	Not conducted
Conclusion	Technology is not a candidate for Phase 2 review

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

2. Background and Introduction

2.1 Purpose/Scope of Study

This study is performed in accordance with the requirement established by the State Water Resources Control Board (SWRCB) for Southern California Edison (SCE) to conduct a detailed evaluation to assess compliance alternatives to once-through cooling for SONGS. This requirement is associated with the *California State-wide 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 operational strategy measures for SONGS based on the list of site-specific criteria approved by the review committee. The evaluation process includes critical review of published data and literature, consultation with permitting agencies and technical assessment supported by engineering experience and judgment. No new field data was collected as part of this effort. The results of the evaluation are used to characterize the feasibility of this technology and its possible selection as a candidate for further investigation in a follow-on phase of this study.

2.2 Regulatory History

2.2.1 Federal

The U.S. Environmental Protection Agency (USEPA) has proposed standards to meet its obligations under the Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. More specifically, this section requires that National Pollutant Discharge Elimination System (NPDES) permits for facilities with cooling water intake structures ensure that the location, design, construction, and capacity of the structures reflect the best technology available to minimize the harmful impacts on the environment. These impacts are

associated with the significant withdrawal of cooling water by industrial facilities, which remove or otherwise impact significant quantities of aquatic organisms from the waters of the United States. The 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, 2011)

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

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

Large power plants (with actual intake flow of 125 mgd or greater) would also be required to conduct a 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, which mandated the calculation of baseline against which reduction in entrainment and impingement can be measured.

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

2.2.2 State

The SWRCB is responsible for ensuring compliance with the finalized Section 316(b) rules in California and it has been actively pursuing a parallel path regulatory program that is focused on the state's coastal generating stations with once-through cooling systems including SONGS. 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 SONGS, 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 fps or below—Track 1, or
- Reduce impacts to aquatic life comparably by other means – Track 2

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

SONGS operates two independent cooling water intake structures to provide cooling water to the once-through circulating water system for Unit 2 and Unit 3. Each unit’s design water withdrawal rate is nominally 828,000 gpm or 1,192 million gallons a day (mgd). Both units withdraw water from separate, parallel submerged conduits extending 3,183 feet offshore, terminating at a depth of 32 feet in the Pacific Ocean. The submerged end of each conduit is fitted with a velocity cap to minimize fish entrainment by transforming the vertical flow to a lateral flow, which encourages a flight response from fish in close proximity to the structure.

The onshore portion of each intake consists of six vertical traveling screens fitted with 3/8-inch mesh panels. The traveling water screens’ through screen velocity is 3 fps (SCE 2008). Screens are rotated based on the pressure differential between the upstream and downstream faces or manually. A high pressure spray removes any debris or fish that have become impinged in the screen face. The vertical traveling screens are angled at approximately 30° to incoming flow. This feature, combined with a series of vertical louvers placed in the forebay, guides the fish to a quiet zone at the end of the cooling water intake structures. A fish elevator periodically empties captured fish into a 4-foot-diameter conduit that returns them by gravity flow to a submerged location approximately 1900 feet offshore (Tetra Tech, 2008). Also housed in the cooling water intake structure of each unit are four saltwater cooling pumps, each rated 17,000 gpm. These pumps are safety-related and located downstream of the traveling water screens. Operation of one pump is sufficient to supply the saltwater cooling needs for one unit. The total saltwater cooling flow needs for both units is 34,000 gpm (SONGS, 2004).

SONGS is also planning to add a “large marine organism protection device” to reduce the spacing between the exclusion bars to less than 9 inches in conformance with SWRB’s *Statewide Water Quality Control Policy on the Use of Coastal and Estuarine Water for Power Plant Cooling*. (Enercon, 2012)

The offshore velocity cap of the SONGS cooling water intake system and onshore angled traveling screen system collectively help reduce entrainment and impingement impacts on aquatic life. These systems, along with various previous quarterly impingement monitoring programs represent ongoing measures by SONGS to demonstrate compliance with previously applicable Section 316(b) regulatory guidance. This guidance can be described as an overarching federal regulation (40 CFR 125.90(b)) and broadly expressed state policies and permit language, which collectively required facilities to implement Section 316(b) rules using professional judgment on a case-by-case basis.

2.3 Screening Process (A/B Criteria)

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



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

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

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

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

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

3. Technology Description

3.1 General Intake Descriptions

As described in Section 2.2, the normal once-through cooling water requirement for each SONGS unit is 828,000 gpm. Two independent cooling water intake structures provide cooling water to Units 2 and 3. Cooling water is withdrawn from the Pacific Ocean through two submerged intake conduits, each extending 3183 feet offshore at a depth of approximately 32 feet. The submerged end of each conduit is fitted with a velocity cap to reduce the entrainment of fish into the system by converting the vertical flow to a horizontal flow, thus triggering a flight response from fish. Water enters the offshore velocity cap at an average velocity of 1.8 feet per second (fps) supplying water to an 18-foot-diameter conduit with average water velocity of 7.6 fps. The 18-foot pipe delivers water to onshore pump intake structure by gravity.

3.2 Existing Fish-Handling System

The current design of the cooling water intake structures provides reductions in fish losses by employing an offshore submerged velocity cap intake in combination with an onshore fish-handling system with fish lift. Inside the onshore pump intake structure, the cooling water passes through a series of vanes and angled louvers located in front of the traveling screens. The louvers and vanes are designed to guide fish to a quiet water area at the end of the intake where the fish-handling system is located. There is a fish lift located in front of the traveling screens. The lift consists of a large tray that rests on the bottom of the intake, which can be raised via a belt to collect fish in the water column in front of the screen. The tray is then tilted to transfer fish and shellfish collected to the fish return system, which transfers them offshore to the Pacific Ocean. The louvers also function as bar racks designed to prevent large debris from entering the intake screens. The fish-handling system is operated daily and returns fish to the ocean through a common conduit for both units.

The traveling water screens were designed to rotate based on the pressure differential between the upstream and downstream faces or manually with a high pressure spray to remove any debris or fish that have become impinged on the screen face.

3.3 Operational Strategies to Reduce Impingement and Entrainment

The operational strategies referred to here are the actions, which will reduce the impingement and entrainment. These actions do not include major modifications to the existing cooling water system. The major modifications are addressed under other technology assessments that are the subject of other reports.

The operational strategies considered fall into three main categories:

- Cooling Water Flow Rate Reduction
- Continuous Operation of Fish-Handling System
- Fish Deterrence Systems

3.3.1 Cooling Water Flow Rate Reduction

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

SONGS is a base load plant and so does not normally vary its water withdrawal rates, except during maintenance, repair, and refueling. The potential opportunity to achieve lower cooling water withdrawal rates, however, may occur during off-peak seasons when power demands are reduced. SONGS is a base loaded plant so an increase in the temperature across the condensers can, in theory, reduce the total amount of cooling water flow rate required by the system. However, there will be a corresponding increase in the discharge temperature of the water sent back to the ocean, which leads to a potential increase in the thermal impact at the outfall diffusers. Due to the sensitive nature of the response of the aquatic environment to the thermal discharge at the nearshore waters of SONGS, this operational alternative cannot be characterized a viable strategy.

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

The level of flow reduction achievable, in response to a reduction in power output, depends primarily on the plant design of the steam conversion system and the cooling water system. The circulating water system for SONGS uses four single speed pumps per unit with a flow capacity of 207,000 gpm per pump. The SONGS system configuration limits the amount of flow that can be reduced, as it requires a minimum of two circulating water pumps (out of four pumps) per unit to be running to supply seawater to the condensers when that unit is in operation. Each pump has a design minimum flow requirement for the pump. In a two pump (per unit) operation mode, the pumps can be put in a runout condition with the output from each pump higher than their rated capacity, typically on the order of 130 percent increase. As an operating case example for two out of four pumps scenario, the system produces approximately 65 percent (or 35 percent flow reduction) of the design flow rate for the unit. Considering the through screen velocity of approximately 3 feet per second at the traveling water screens for the existing intake system, the 35 percent flow reduction results in a through screen velocity of approximately 2 fps well above the desired 0.5 fps criterion..

Further pump flow reduction can be achieved by throttling the downstream valves in the circulating water system. However, to reduce the through screen velocity to 0.5 fps for impingement reduction considerations, the system flow will need to be throttled down by a factor of 4. Such a reduction is not likely to be feasible because the pump has to operate at minimum flow requirement or higher.

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

3.3.2 Continuous Operation of Fish-Handling System

Current SONGS intake has a fish-handling system that contains fish-handling bucket to lift fish guided to the holding area in front of traveling screens. The system operates daily and could be operated continuously to lift fish in the holding area to the existing fish return.

3.3.3 Fish Deterrent Systems

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

- Air Bubble Curtain Air bubble curtains have been used at many locations in an attempt to divert or deter the movement of fish. The success of this device has been variable and appears to be affected by such factors as aquatic life species, water temperature, light intensity, water velocity, and orientation of the curtain within a water body (ASCE, 1982).
- Hanging Chain Curtain A typical hanging chain curtain might consist of a row of chains placed across the intake channel (ASCE, 1982). It acts as a fish barrier but its practicality at offshore velocity cap location is questionable.
- Acoustic Fish Deterrents There are two general types of acoustic fish deterrents: continuous wave and pulsed wave. Both of these deterrents use sound/pressure waves (noise) to influence the behavior. Acoustic fish deterrents are portable or can be mounted on stationary platforms.

Because of the lack of consistent long-term performance data and the fact that their effectiveness is highly site, species and time dependent, it is anticipated that only marginal overall improvement on entrainment reduction can be achieved with this fish deterrent systems.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 General Discussion

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

The initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable). This applicability of

each permit/approval to the proposed operational strategies was evaluated. Those permits and approvals, which were deemed applicable, were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria, which would preclude the applicable permit or approval from ever being issued or granted. That is, the focus was to screen each applicable permit or approval for fatal flaws in the associated regulatory review process, which would preclude the operational strategies from further consideration.

The assessment also focused on identifying the critical path (longest duration) initial permitting processes, that is, those that support site mobilization, physical site access, initial work activities 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 implementation and subsequent operation that are not critical path to the initial implementation activities were also included in the assessment since these items could pose significant operational constraints to future SONGS 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)
- U.S. Marine Corps – Camp Pendleton (USMC)
- California Public Utility Commission (CPUC)
- California Coastal Commission (CCC)
- California State Lands Commission
- State Water Resources Control Board (SWRCB)
- San Diego Regional Water Quality Control Board (SDRWQCB)
- San Diego Air Pollution Control District (APCD)
- San Diego County Department of Environmental Health

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

4.1.2.1 Operational Strategies Water Pumping System

Operational strategies covered in this report include evaluating load reduction, operating existing fish-handling system continuously, and adding deterrent systems. Note that modifications on adding fish collection and return system to individual traveling screens with changing screen panel to fine mesh screens are covered in the inshore mechanical fine mesh technology report and therefore they are not covered here.

U.S. Army Corps of Engineers

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

For minor impacts the USACE has established a general permit program (nationwide permit) for a host of less significant work processes involving waters of the United States. The marine work associated with this cooling system option may be a candidate for this nationwide permit permitting process. If the Nationwide process cannot support the marine work associated with these strategies, SONGS 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 SONGS area explained that all USACE facilities have goal to issue an individual Section 404 permit within 120 days of deeming the associated application complete (Lambert, 2012). This period is a goal, not a statutory commitment. Consequently, in many cases this goal is not realized. These delays are often associated with the mandated consulting processes that need to be pursued with the State Historic Preservation Office, U.S. Fish and Wildlife Service, or National Marine Fisheries Service. In other cases, there are extensions of public notice periods or scheduling complications for the public hearing. The applicant for the Section 404/10 permit has to directly pursue consultations with California Coastal Commission (CCC) and SWRCB. Receipt of an individual Section 404 permit is contingent on previous receipt of permits from the CCC and SWRCB.

This difficult situation is impeded further by the under-staffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and contentious situations, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process. However, given the minor nature of the new marine work associated with these operational strategies, it is unlikely that the Section 404 will represent a critical path item to the completion of permitting.

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

U.S. Marine Corps – Camp Pendleton

SONGS is located on leased property that is part of the USMC Camp Pendleton. Any significant physical improvements to the SONGS facility, such as addition of closed cooling systems are potentially subject to a formal review and approval process by the USMC and U.S. Department of the Navy.

The SONGS resides on land that is subdivided into two leases and 9 easements. The SONGS lease grants the USMC and the U.S. Department of the Navy authority to review and improve physical improvements on the subject property (Rannals, 2012). While this authority does not formally extend to offshore properties, the USMC is also interested in offshore work in the area, since it could potentially impact their offshore training activities.

Implementation of the operational strategies will not demand any additional federal land. The associated construction effort will be largely confined to existing onshore or nearshore systems. Consequently, this option is

not expected to require any modification of current SONGS lease arrangement with the U.S. Department of the Navy.

California Public Utility Commission

SONGS is regulated by the California Public Utility Commission (CPUC), which is charged with overseeing investor-owned public utilities. Given the lack of significant county involvement on this federal property, the CPUC will likely be designated the lead agency for the CEQA review process. CEQA is regulatory statute, which requires state or local regulatory agencies to identify, assess, avoid or otherwise mitigate the significant environmental impacts from the proposed action—the addition of new cooling system operational strategies.

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

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

California Coastal Commission

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

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

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

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

The CCC will view marine resource protection benefits of these various strategies as wholly positive outcomes. The overall weight of these positives in their balancing of environmental impacts is somewhat reduced by the fact that Commission is not primarily charged with evaluating the cooling system's compliance with Section 316(b), *California Once-Through Cooling Policy*, Phase II criteria or NPDES thermal discharge considerations.

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

California State Lands Commission

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

- **Categorical Exemption** – applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use.
- **Mitigated Negative Declaration** - applicable for work that poses minor environmental impacts, during noncritical seasons, for limited period of time. The current SONGS marine mammal screening retrofit work has been reviewed and approved via *Mitigated Negative Declaration*.
- **Environmental Impact Report/CEQA Process** – applicable for work that could potentially generate significant environmental impacts, utilizes heavy construction equipment, and/or will continue over a significant time periods (months). This review process is not fast-track and could extend for a year.

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

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

State Water Resources Control Board - San Diego Regional Water Quality Control Board

While the SWRCB has overall permit authority for California's two active the nuclear power stations, while the Regional Water Quality Control Board has the follow-on inspection and enforcement role for the issue

permits. For SONGS, the SWRCB expects to modify the existing NPDES permit in support of the proposed operational strategies. The lack of significant disruption to local land surfaces is expected to negate any need for new waste discharge requirements permit for construction impacts to jurisdictional streambed areas and possibly avoid the need to seek coverage under the general storm water permit for construction activity.

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

Both the SWRCB and SDRWQCB representatives (Jauregui, 2012 and Morris, 2012) explained that there are no obvious regulatory barriers regarding issuance of a revised NPDES permit for any of the cooling system options currently under consideration, including the operational strategies. The SDRWQCB 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 operational strategies entrainment and impingement performance will fall well short of closed cooling cycle attributes.

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

San Diego Air Pollution Control District (APCD)

SONGS is located within the San Diego 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 (Annicchiarico, 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 operational strategies – which collectively, will not generate any additional operational air emissions.

San Diego County Department of Environmental Health

As SONGS is located entirely on leased federal property that is part of the USMC Camp Pendleton, any significant physical improvements to the SONGS facility are not subject to San Diego County review. The review process is essentially delegated to the USMC and U.S. Department of the Navy. Consequently, most of the San Diego County Departments (Planning and Land Use, Public Works, and Building Division) do not directly regulate SONGS.

Despite the fact that the county oversight for SONGS is constrained, there are six separate ongoing county-led regulatory programs at this facility (Mache, 2012). County Environmental Health Department has received CalEPA approval to be the Certified Unified Program Agency responsible for management of the following programs:

- California Aboveground Storage Tank Program – mandates development and implementation of a Spill Prevention Control and Countermeasure Plan (SPCC) and tank inspections.
- California Underground Storage Tank Monitoring Program – addresses fuel storage and leak detection in Mesa Complex and power block area.
- Hazardous Waste Storage and Treatment – includes small proprietary oil separation facility.
- Medical Waste Disposal – a county ordinance makes this an Environmental Health Department responsibility.
- Clean Air Act 112r Risk Management Plan – addresses onsite aqueous ammonia storage
- Hazardous Material Business Plan – addresses storage of greater than 55 gallons of chemicals with potential for offsite impacts and addresses the facility’s Emergency Planning and Community-Right-to-Know Act (EPCRA) responsibilities.

The operational strategies will likely not demand any additional chemical additives, generate new waste streams, or force the relocation of any existing chemical and fuel storage systems. Consequently, this option does not appear to present any obvious county-sponsored regulatory barriers or represent critical path permitting processes.

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. The operational strategies, however, entail little or no new land disturbance that would impact sensitive biological or cultural resources, either onshore or offshore.

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

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

4.1.2.2 Summary

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

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

The assessment also indicated that the CPUC-sponsored CEQA review process, even in its expected abbreviated form, will likely represent the critical path approval (6–9 months) for the operational strategies. Obviously, the duration of this critical path process does not represent barrier to development of this cooling technology system.

4.2 Impingement/Entrainment Design

4.2.1 General Discussions

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

4.2.2 Detailed Evaluations

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

Cooling Water Flow Rate Reduction

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

Flow reduction capability is limited by SONGS circulating water system equipment and operating constraints that consist of the following: a) single speed cooling water pumps need to operate above their minimum continuous flow rate, b) a minimum number of operating pumps are required (two per unit) to supply cooling water to the condensers, and c) there are limit on the ability of valve throttling to reduce flow. These constraints will limit the ability of the system to reduce flow and lower impingement and entrainment losses pro-

portionally to an acceptable level commensurate with the Section 316(b), *California Once-Through Cooling Policy* requirements.

The required through screens velocity of 0.5 fps cannot be achieved with the two pumps out of four (per unit) operating mode. For a limited flow reduction of approximately 35 percent under the two out of four pumps operation, the through screen velocity will decrease from 3 fps to approximately 2 fps - a velocity still four times higher than the desired through screen velocity of 0.5 fps. Downstream valve throttling is required to bring the operating pump flows to even lower limits, but the throttling of valves may not be acceptable due to their size and potential for cavitation. These levels are usually high for such size pumps, which limits the level of flow reduction that can be achieved. The implementation of the flow reduction operational strategy will introduce marginal benefit with respect to the reduction of entrainment and impingement. For instance, assuming conservatively that the off peak season (winter/spring) lasts 6 to 8 months, and the generation load and the corresponding cooling water flow could be reduced by a hypothetical 35 percent in keeping with the circulating water system operational constraints, the annual water withdrawal volume would drop at most by 15 to 20 percent that would offer parallel improvements to impingement mortality and entrainment loss. In addition, according to an SCE field study from 2006 to 2007 (SCE 2008), the egg and larvae concentrations for various species are highest from April to June, with the larvae for sea bass peaking in July and August (2006). The varying seasonality of different larval fish near SONGS intake suggests that not all organisms would benefit equally from flow reduction during off the peak seasons of winter and spring.

Continuous Fish-Handling System Operation

The existing fish-handling system with a fish lift provides a potential pathway for fish entrained at the off-shore velocity caps to escape and return to sea. Currently it is operated daily. The traveling water screens are for debris handling only and, SONGS does not have individual fish collection and return system on them (fish bucket on screen panel with low pressure spray).

For screens installed with fish collection and return system, several impingement evaluation studies suggested that continuous screen rotation will decrease impingement time, thus improving the survival rate of the impinged organisms. However, studies conducted for a plant in Maryland showed that survival with continuous screen rotation, which would have reduced the time that organisms were trapped on the screens, was not significantly different from survival with normal screen wash operations, with screens being rotated for 10 minutes and stationary for 50 minutes of each hour (McLean, 2003).

Similarly, for the existing fish-handling bucket to operate continuously around the clock, it will not result in any improvement in entrainment reduction and it is anticipated any attainable impingement reduction benefits would be incremental.

Fish Deterrent Systems

Fish deterrent systems, such as air bubble curtain or hanging chain curtain, are highly site and species dependent and they are not practicable for the SONGS offshore velocity caps, which are located 3,200 feet offshore. These devices, nonetheless, can only deter adult fish and will not reduce entrainment of fish eggs and fish larvae..

For air bubble curtain, the deployment of such a system at SONGS will require the installation of a ring diffuser (over 80 feet in diameter) around each offshore velocity cap to supply a significant amount of com-

pressed air over a substantial offshore distance – a somewhat in practical matter. In addition, the influence on aquatic life is unknown and would require follow-up site-specific field studies.

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

Finally, because of the lack of consistent long-term performance data and that the uncertain effectiveness of a system that is highly influenced by site-specific conditions only marginal reductions of entrainment are expected.

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

4.3 Environmental Offsets

4.3.1 4.3.1 General Discussion

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

In some cases, regulatory agencies may be so constrained by their regulatory foundation that offset opportunities are limited or unavailable. The San Diego 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, which supports a more flexible approach to utilizing environmental offsets to generate the maximum net environmental benefit.

With these considerations in mind, the following assessment of offsetting environmental impacts focuses on identifying both positive and negative construction and operational environmental impacts associated with

the construction and operation of operational strategies system from a broad range of environmental evaluation criteria.

4.3.2 Detailed Discussion

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

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

The results of these evaluations and impact categorization are subsequently summarized in the Table OS-2.

Air

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

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

Surface Water

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

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

Groundwater

Given the limited nature of the construction need to implement the operational strategies system, no significant additional groundwater resources will be needed. The operational strategies systems are not expected to require any additional groundwater resources.

Waste

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

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

Noise

Previous studies have concluded from consultations with the County of San Diego County, City of San Clemente and Camp Pendleton, that noise levels are expected not to exceed 70 dBA at the nearest public receptor (Tetra Tech, 2008). Noise levels from implementation activities for these operational strategies will be largely unchanged, since the related construction work is limited.

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

Land Use

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

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

Marine Ecological Resources

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

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

Terrestrial Ecological Resources

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

Cultural and Paleontological Resources

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

Visual Resources

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

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

Transportation

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

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

Socioeconomic Issues

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

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

4.3.3 Summary

Table CS-2 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socio-economic environmental offsets regarding implementation of the operational strategies. The construction impacts associated with the fish deterrent systems could be characterized as having small negative impact significance, because of the minor increase in construction phase air emissions and wastes. These impacts are not offset by the limited employment opportunities that may be gained during this same period. Operationally, there is a small positive impact significance related to the operational strategies improved abilities to screen out, retrieve and return

aquatic life to their natural environment. Viewed collectively, the pattern of environmental impact significance ratings suggest that implementation of operational strategies system may offer an overall weak net-positive environmental benefit.

4.4 First-of-a-Kind

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

4.5 Operability General Site Conditions

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

4.6 Seismic and Tsunami Issues

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

4.7 Structural

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

4.8 Construction

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

4.9 Maintenance

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

5. Conclusion

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

6. References

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**Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station**

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the operational strategies system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Department of Navy and United States Marine Corps – Camp Pendleton Lease	Not applicable - U.S.MC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease for significant additions to the SONGS leased property or adjacent Camp Pendleton lands. The operational strategies will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers (USACE)	Implementation of some of the operational strategies could impact impacts to Waters of U.S.. and could lead to the need for an individual form of the permit.	120 days from complete application (goal) ~12 months (expected)	No	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers (USACE) & Regional Quality Control Board (RWQCB)	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	NA
Nationwide Permit – U.S. Army Corps of Engineers	The implementation of operational strategies could generate modest impacts to Waters of the U.S., that could potentially be addressed by the Nationwide permitting process.	1-3 months	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable - the addition of the operational strategies water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA



**Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)**

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA)	Not applicable - the addition of the operational strategies system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable - the addition of the operational strategies water system will demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Not applicable - superseded by Department of Navy lease arrangement with SONGS. The addition of the operational strategies 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 CEQA review process regarding the proposed operational strategies system. The CEQA review process could include preparation of an Initial Study, followed either by a Negative Declaration or a Mitigated Negative Declaration. This decision would support the process to determine if Southern California Edison can recover the costs associated with the operational strategies system.	6 - 9 months nominally	Potential	No
California Energy Commission (CEC) – Final Decision	Not applicable – the implementation of operational strategies will not result in a net power capacity (increase) > 50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Not applicable - the operational strategies system will not demand any additional land, nor involve any exterior changes to existing structures in the Coastal Zone.	Not applicable	NA	NA



Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Coastal Development Lease – California States Lands Commission	The operational strategies system will involve some limited work in the marine environment.	Connected to CEQA (~9 months)	Potential	No
Regional Pollution Control District Permit to Construct (ATC) – San Diego Regional Air Pollution Control District	Not applicable - the strategies will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTC) – San Diego Air Pollution Control District	Not applicable – the strategies system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – Sand Diego Air Pollution Control District and U.S.EPA	Not applicable – the strategies system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - U.S.EPA	Not applicable - the strategies system will not generate any additional operational acid rain-related air emissions.	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces and so will not generate any significant supplemental dust emissions. The strategies themselves, in operation, will not generate any additional dust emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board (RWQCB) and State Water Resources Board	The operational strategies will alter some aspects of intake operation, but it will not change the peak water withdrawal rates, nor appreciably change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No



**Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)**

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board (RWQCB)	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Quality Control Board (RWQCB)	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board (RWQCB)	Not applicable - SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the operational strategies 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, Regional Quality Control Board (RWQCB)	Not applicable - SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Department of Fish & Game (CDFG)	Not applicable - the implementation of operational strategies water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA



Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Lake and Streambed Alteration Agreement - California Department of Fish & Game (CDFG)	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation (OHP)	Not applicable - the operational strategies will not demand any additional land nor disturb any previously undisturbed surface.	Not applicable	NA	NA
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, U.S.EPA, San Diego County Department of Environmental Health - California Unified Program Agency	Implementation of the strategies could potentially require an ID number to support management or construction wastes, unless current SONGS ID will be utilized.	1-2 weeks	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation - Department of Toxic Substance Control, U.S.EPA, San Diego County Department of Environmental Health - California Unified Program Agency	Not applicable – the implementation of the operational strategies will allow for the continuing utilization 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 Diego County Department of Environmental Health - California Unified Program Agency and U.S.EPA	Not applicable – the implementation of the operational strategies is not expected to require additional water treatment chemicals.	Not applicable	NA	NA



**Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)**

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Underground Storage Tank Permit - San Diego County Department of Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable – the implementation of the operational strategies is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health - California Unified Program Agency and U.S.EPA	Not applicable – the implementation of the operational strategies will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 - San Diego County Department of Environmental Health - California Unified Program Agency and U.S.EPA	Not applicable – the implementation of the operational strategies is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval - San Diego County Department of Planning and Land Use	Not applicable - the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment - San Diego County Department of Planning and Land Use	Not applicable - the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit - San Diego County Department of Public Works & Planning and Land Use	Not applicable - the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Diego County Department of Public Works	Not applicable - similar to the construction-phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA



Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable because the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) -San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned.	Not applicable	NA	NA
San Diego County Well Water Permit - San Diego County Department of Environmental Health	Not applicable – no new wells to be developed.	Not applicable	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the operational strategies elements will probably not prove to be oversized	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable - while local municipality rules may supersede this regional land use//watershed protection-related project approval process, this is not the case for SONGS.	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 SONGS.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – implementation of the operational strategies are not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The implementation of operational strategies may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan.	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable - No new sanitary connections are envisioned.	Not applicable	NA	NA

Table OS-1.
Environmental Permit/Approval Assessment: Operational Strategies Operational Strategies
to Reduce Impingement and Entrapment
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the implementation of the operational strategies will not pose any road crossing or encroachment issues.	Not applicable	NA	NA



**Table OS-2. Offsetting Impacts for Operational Strategies
San Onofre Nuclear Generation Station**

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NO _x , 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 SONGS generation during the plant outage to implement the operational strategies.	The operational strategies will not result in any significant changes to plant efficiency and so no significant changes in overall air quality impacts are expected during operation.	Insignificant temporary increase in CO ₂ greenhouse gas emissions from commuting traffic during associated plant outages.	Small Negative	None
Surface Water	No surface water impacts during construction either supplemental consumptive uses or storm water-related impacts.	The strategies will not alter the water withdrawal intake rate or cooling water discharge rate.	Not applicable	None	None
Groundwater	No additional groundwater resources will be needed to support construction.	No additional groundwater resources will be needed to support these operational strategies.	Not applicable	None	None
Waste	Constructions-related waste will be generated during the outage to implement these strategies. The majority of these wastes will be recyclable metal that will not impact offsite disposal facilities.	There may be a minor increase in waste generation during operation from the improved screening operations.	Insignificant temporary increase in construction wastes and some metal recyclables.	Small Negative	None
Noise	Noise levels from construction will be largely unchanged, since the primary work areas will be limited to inshore or nearshore areas that house existing equipment.	Operational noise levels are expected to be largely unchanged as a result of the new pumping system.	None	None	None
Land Use	Related construction activities are largely confined to previously disturbance onshore land and subaqueous land.	The strategies primarily occupy areas with existing marine-based equipment, so there are no permanent changes in land use.	None	None	None

**Table OS-2. Offsetting Impacts for Operational Strategies
San Onofre Nuclear Generation Station (cont.)**

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Construction activities are confined to the previously developed nearshore and onshore areas. There is limited potential to impact previously undisturbed marine habitat.	The improved screening operations and attempts to retrieve and return aquatic life to their natural marine habitat offer some benefits. These strategies fail to appreciably reduce the through screen intake velocity and/or reduce cooling water intake and the related entrainment losses.	None	None	Small Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	None	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed onshore and nearshore land, there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of cultural or paleontological resources.	None	None	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The operational strategies will not result in any permanent change in external profile of the facility.	None	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The operational strategies will not significantly alter the current number of plant deliveries or operating commuting personnel.	Level of Service Impacts (pending later phase)	Small Negative	None
Socio-Economic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the operational strategies.	Employment Levels (pending later phase)	Small Positive	None

Notes: Levels of Impact 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.

