Prepared for

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL™ Company

and the
State Water Resources Control Board
Nuclear Review Committee

Independent Third-Party Interim Technical Assessment

for the Deepwater Offshore Intake for San Onofre Nuclear Generating Station

Prepared by BECHTEL Bechtel Power Corporation

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Independent Third-Party Interim Technical Assessment

for the

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Revision	Date	Affected Sections
0	July 22, 2012	Initial Issue

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List of Abbreviations and Acronyms

agl	above ground level
APCD	(San Diego) Air Pollution Control District
ATC	Air Pollution Control District Authority to Construct
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
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

The primary objective of implementing the deepwater intake technology is to locate the withdrawal inlet selectively in deeper waters where, in theory, biological abundance will be lower. This relocation offers the possibility of substantially reducing the entrainment of aquatic species at different stages of life (including fish, fish egg and larvae) and reducing impingement mortality.

Permitting is expected to be contentious and have lengthy processes that will be aligned with the CEQA/Environmental Impact Report review process. The primary difficulty appears to be that the deepwater intake system poses significant construction impacts to marine habitats, while offering only some limited potential for reductions in entrainment impacts. Despite this incremental improvement, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria, which would preclude this technology option from securing the necessary construction and operating permits and approvals.

This study concludes that there is no advantage realized by relocating the offshore intake to deeper, more distant location, since the population of a variety of fish and larvae are present in a wide range of water depths. Even though construction of two new 18-foot-diameter, 13,000 feet long offshore intake pipes and associated new offshore velocity caps and a new onshore pump intake structure are potentially feasible, this combined strategy would be pushing the limit of hydraulic design for large flow intake systems. There is no definitive evidence to demonstrate that the required reductions in entrainments can be achieved with this relocation to a deeper intake site. When considering the environmental impacts from the associated significant disturbance to the local marine environment associated with the relocation of the existing intakes to a deeper, more distant offshore location is not expected to produce any appreciable benefits regarding entrainment. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

Criterion	Status
External Approval and Permitting	No fatal flaws
Impingement/Entrainment Design	Studies have shown that the entrainment will not be improved for this design, so this is considered not viable.
Environmental Offsets	No fatal flaws.
First-of-Kind to Scale	Not evaluated.
Operability of General Site Conditions	Not evaluated.
Seismic and Tsunami Issues	Not evaluated.
Structure and Construction	Not evaluated.
Maintenance	Not evaluated.
Conclusion	**Technology is not 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 Southern California Edison (SCE) to conduct a detailed evaluation to assess compliance alternatives to once-through cooling for the San Onofre Nuclear Generating Station (SONGS). 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) that 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 deepwater offshore intake technology 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 United States 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 that remove or otherwise impact significant quantities of aquatic organisms present in the waters of the US. 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) were addressed in the Phase I rules, initially promulgated in December 2001. Existing power plants were subsequently addressed, along with other industrial facilities, in the Phase II version of the rules, issued in February 2004. Since then the rule has been challenged, remanded, suspended, and re-proposed. The current proposed version of the rule dictates that all existing facilities that withdraw 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 (with actual intake flow of 125 million gallons a day [mgd] or greater) would also be required to conduct studies to help their local permitting authorities (SWRCB) to determine site-specific best technology available 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 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 *Use of Coastal and Estuarine Waters for 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 feet/second or below—Track 1, or

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

This policy is being implemented through a so-called "adaptive management strategy" that is intended to achieve compliance with the policy standards without disrupting the critical needs of the state's electrical generation and transmission system. A Nuclear Review Committee was later established to oversee the studies that will investigate the ability, alternatives, and costs for both SONGS and DCPP 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 Unit 2 and Unit 3. Each unit's water withdrawal rate is nominally 828,000 gpm or 1,192 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 that 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. 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 30º to incoming flow. This feature, combined with a series of vertical louvers place in the forebay, guides the fish to a quiet zone at the end of the cooling water intake structure. 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 (TetraTech, 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). Along the existing offshore intake pipes, there is a dedicated and Category I inlet ensuring saltwater cooling water supply of 34,000 gpm.

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 SONGS cooling water intake system's offshore velocity cap, onshore angled traveling screen system collectively help reduce entrainment and impingement impacts to aquatic life. These systems, along with various previous quarterly impingement monitoring programs have represented SONGS ongoing measures 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), *California Once-Through Policy* 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 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, as 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 Existing Intake and Discharge Descriptions

At SONGS, the current cooling water intake system for each unit consists of an 18-foot-diameter buried offshore pipeline system withdrawing seawater via a velocity cap intake located 3,200 feet offshore. The 18-foot pipe delivers water to the onshore pump intake structure through gravity. While the current velocity cap intake technology has demonstrated benefits in reducing the fish entrainment, the deepwater intake concept is intended to enhance this system's effectiveness in aquatic life protection through the appropriate selection of the withdrawal location.

The cooling water withdrawn from the intake system passes through condenser and various heat exchangers and then is combined with low-volume wastes generated at the plant before being discharged back to the Pacific Ocean via an 18-foot-diameter pipeline. The discharge is released to the sea through a series of diffusers designed to dissipate the discharge heat. Each unit's discharge conduit is 18 feet in diameter (total of two) and they extend offshore 8,500 feet for Unit 2 and 6,000 feet for Unit 3.

3.2 Previous Intake Relocation Study

The Marine Review Committee previously conducted an evaluation of the benefits of moving SONGS cooling water velocity cap intake structures further offshore to a location that could reduce overall entrainment (EPRI, 2008). It was estimated that relocating the intakes to a point 3,000 feet further offshore (60 feet water depth) would impact some 192,000 square feet of benthic habitat. At this distance there need to be some consideration of the potential for interaction with the thermal discharge that reaches this distance offshore. The EPRI study determined that the species composition of entrained organisms would be altered by this shift in intake location. There would be reduced entrainment of forage species, but increased entrainment of recreational and commercial species.

The Marine Review Committee concluded that (EPRI, 2008) relocating the intakes to a different location along the coast would result in no consistent difference in species composition and population being withdrawn by the intake system. As a result, no definitive benefit could be established for relocating the intake to deeper water. With no clear evidence that a significant entrainment reduction would be achieved with this option, it was dismissed from further consideration in the EPRI study.

3.3 Deepwater Technology Requirements

As described in Sections 4.2.1 and 4.2.2 below, the fish and fish larvae are found to be present and distributed over a wide range of water depths and offshore distances. In addition, fish can be attracted to the offshore intake structures due to their behavioral characteristics. As a result, no definitive location and water depth can be identified for the offshore intake that would comprehensively meet the objectives of the Section 316(b), *California Once-Through Cooling Policy*, especially pertaining to improvements regarding entrainment reduction. Nonetheless, the engineering requirements for a deepwater intake system, with withdrawal located at approximately 13,000 feet offshore of SONGS with 70 feet of minimum water depth, are delineated and used as the basis for evaluating this technology against the screening criteria set forth in Section 2.3. This offshore location combined with SONGS once-through cooling water flow rate are pushing the limit of the state of technology for hydraulic design of the associated large pump intake system.

To evaluate the engineering aspects associated with relocating the intake heads further offshore, it is assumed that the intakes will be located beyond that described in the EPRI 2008 study and also beyond the discharge diffusers to minimize any potential impact on the thermal mixing and dispersion performance of the discharge system. Since the Unit 2 discharge diffuser is close to 9,000 feet offshore at a depth of approximately 50 feet, this evaluation assumes a location at a water depth of 70 feet or deeper. Based on the limited bathymetric information, the 70 feet depth is estimated to be approximately 13,000 feet offshore (see Figures DW-1 and DW-2).

The relocation of intake heads to 13,000 feet (4 kilometers) offshore or beyond will result in an offshore pressure drop of over 20 feet. Major structural modifications to the existing SONGS structures and associated construction activities would be required to accommodate this pressure drop in the offshore portion of the system. The new deepwater intake components for each unit will include the construction of a new 18-foot-diameter offshore pipeline extending 13,000 feet offshore, three new velocity caps, and a new deeper shoreline pump intake structure. The need for new intake structure is a result of substantial increase in head loss that will require demolishment of existing onshore intake structure and construction of a new pump station with a deeper bottom. The intake pumps, motors, traveling screens and trash bars also need to be replaced accordingly. Consideration of additional traveling water screen areas may be necessary to reduce the through-screen velocity to 0.5 feet per second (fps) or lower. Alternatively, the screens could be equipped with a fish handling and return system to further reduce impingement losses. Figures DW-1 through DW-3 show the conceptual features for a typical deepwater technology.

For this evaluation, it is assumed that the three velocity caps will be octagonal in shape and designed with an inlet average flow velocity of 0.5 fps or lower to satisfy the Section 316(b), *California Once-Through Cooling Policy* impingement reduction requirement. Considering the large amount of cooling water withdrawal requirements, the velocity caps horizontal openings will be sized to provide the required flow and required inlet velocity. Large object/large debris exclusion bars will be provided at the inlet to preclude those debris from entering the tunnel. The bars will be 150 millimeters (6 inches) apart center to center.

Generally, the velocity cap technology can be designed and implemented to provide a controlled inlet velocity with the submerged inlet elevated from the sea floor, and a radial horizontal inlet velocity field free from swirling flows. The offshore velocity caps assemblies will probably not present an obstacle to surface navigation due to their deepwater location.

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 construction and operation of a deepwater offshore 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). This applicability of each permit/approval to the proposed deepwater offshore intake option was evaluated. Those permits and approvals, which were deemed applicable, were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria, which would preclude the applicable permit or approval from ever being issued or

granted. That is, the focus was to screen each applicable permit or approval for fatal flaws in the associated regulatory review process that would preclude the deepwater offshore 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 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 (USACE)
- 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 deepwater offshore intake technology and summarizes these findings in Table DW-1. This 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 Deepwater Offshore Intake System

As described in Section 3.2, the deepwater offshore intake system option basically involves abandoning the existing offshore intake and building a new offshore pipeline. The alteration achieves the goal of extending the cooling water inlet to a much deeper water depth (approximately 13,000 feet for Unit 2 and Unit 3) from its current location of approximately 3200 feet offshore in approximately 32 feet of water. The revised system is located in potentially less biologically rich waters, but continues to use the velocity cap system. In addition, the onshore pump house has to be rebuilt to have deeper pump forebays to accommodate much higher head loss in the offshore deepwater intake system,

US Army Corps of Engineers

The USACE is the lead agency for Clean Water Act Section 404 and Section 10 permitting processes, which are focused primarily on impacts to waters of the United States and waterborne navigation. The deepwater offshore intake system will involve offshore cut and fill processes for installing velocity caps for inlets, which will pose significant construction 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 significant marine work associated with this cooling system option precludes any nationwide permit permitting process for cut/fill construction. SONGS, therefore, 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 Corps 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 for the permitting process is impeded further by the understaffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and contentious situations, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process. Given the significant new marine work associated with this cooling technology option, it is likely that the Section 404 will represent a critical path item to the completion of permitting.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any specific barriers or fatal flaws regarding the Section 404 permitting process for the deepwater offshore intake system. (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 USMC is also interested in offshore work in the area, since it could potentially impact their offshore training activities.

While the offshore deepwater intake system is not expected to demand any additional federal land nor add any significant land-based structures, it is possible that addition of this cooling system technology will pose sufficient land-based alterations to trigger a formal review and approval process. If required, the related application is initially submitted to the USMC/Camp Pendleton (with appropriate site plan drawings and associated written descriptions). This application would be reviewed by the Camp Pendleton staff and the staff

would subsequent compile their findings and make a recommendation to the Camp Pendleton Base Commander regarding the application. With this input, the Base Commander would then develop and submit a recommendation to the USMC headquarters and subsequently to the U.S. Department of Navy. The U.S. Department of the Navy would provide the final approval/denial of the proposed new SONGS facility on leased Camp Pendleton property.

While the deepwater intake system may not trigger this formal review and approval process, the associated significant offshore work could be viewed negatively by the USMC, if it appears to compromise their offshore training regimen. It is unclear whether the USMC can (or would choose to) exert influence through their land-based lease and easement arrangement for work carried outside of their lease area.

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 California Environmental Quality Act (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 technology.

The proposed new deepwater intake system will certainly 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 that included the SONGS facility, including the Mesa Complex. 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 system 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 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 appears to be resigned to consider options that may present additional onshore or different offshore impacts to help mitigate the offshore environmental consequences of the existing once-

through cooling. The CCC mandate to protect the coastal resources offers this agency some latitude to balance one set of impacts versus another. This evaluation process is on a case-by-case basis, which can be translated into the conclusion that there are few triggers that would automatically preclude any cooling system options from consideration, including the deepwater offshore intake system.

Despite the lack of obvious fatal flaws, the deepwater intake system will certainly include significant offshore construction efforts, so the CCC will be focused on the deleterious construction impacts on marine resources (for example, local fish, shellfish, vegetation, hard marine substrate, commercial fishing) and the potentially offsetting positive benefits associated with reducing operational entrainment impacts. These impacts will be reduced simply because there is less likely to be a less rich biological environment and so less entrainment losses despite the largely unchanged water withdrawal rate. Visual impacts in the coastal zone, a typical key CCC subject area, will obviously not be an important factor for this largely submerged intake system. The thermal discharge impact matters will be a sideline issue, since the discharge characteristics will 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 that is 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 (6 months–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 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 periods (months). This review process is not fast-track and could extend for a year.

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. As the deepwater intake technology will obviously result in a significant addition of cooling system infrastructure to subaqueous lands, SONGS 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 evi-

dence 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 related marine work in subaqueous lands does not appear to offer any specific impacts or regulatory considerations that represent fatal flaws.

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, 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 deepwater offshore 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.

The deepwater offshore intake system construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the new 18-foot-diameter, 13,000-foot-long offshore pipe for each unit and velocity caps via the cut and fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a biologically productive marine habitat area.

Operationally, the deepwater offshore intake system will not appreciably reduce the impingement impacts, given that a similar velocity cap system is currently in use at SONGS. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Entrainment-related impacts will be reduced if the area less biologically productive primarily because water withdrawal will occur in a deeper less biologically active region. Thermal discharge impacts to aquatic life will remain largely unchanged.

Given that the cooling water withdrawal and discharge rates will be remain essentially unchanged any revisions to the current SONGS 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 cooling system.

Both the SWRCB and SDRWQCB 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 deep offshore intake system. 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 of 0.5 fps or lower, and entrainment/impingement levels equivalent that associated with a closed-cooling cycle system). The deep offshore intake system entrainment reduction performance will fall well short of closed-cycle cooling system 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 deepwater offshore intake system.

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 deepwater offshore intake system—a system that is not expected to 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 and Countermeasure Control Program (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 the 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 responsibilities.

The deepwater intake system will likely not demand any additional chemical additives or force the relocation of any existing chemical and fuel storage systems. Routine maintenance and cleaning needs associated with this new velocity cap will largely unchanged compared with the current cap system. Deepwater intake operation will not 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. Construction and operation of the deep offshore intake system is likely to temporarily and permanently disturbance sensitive marine habitat and also reduce 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 (Enercon). Since this option primarily involves offshore work and underwater facilities, it is unlikely the cultural or historic resources (land-based) will be impacted.

Installation of this largely submerged system will not alter the overall profile of the SONGS 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 (less than 200 feet above ground level).

Finally, the CEC will be largely excluded from the permitting processes primarily because offshore deep offshore intake system will not boost currently power levels of the SONGS facility, let along reach the 50 MW thresholds, which would mandate CEC review.

4.1.2.2 Summary

The external approval and permitting assessment for the offshore system identified a list of potentially applicable federal, state and local permits and approvals that, not surprisingly, focused on its significant impacts to the marine environment. The efforts to conduct a successful CEQA review and secure the 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 processes that will be aligned with the CEQA/Environmental Impact Report review process. The primary difficulty appears to be that the deepwater intake system poses significant construction impacts to marine habitats, while offering only some reductions in entrainment impacts. Despite this incremental improvement regarding entrainment-related losses, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria, which 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 deepwater offshore 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 deepwater offshore intake system. This critical path process does not represent barrier to development of this cooling technology system.

4.2 Impingement/Entrainment Design

The primary objective of implementing the deepwater intake technology is to locate the withdrawal inlet selectively in deeper waters where, in theory, biological abundance will be lower. This relocation offers the possibility of substantially reducing the entrainment reduction of aquatic species at different stages of life (including fish, fish egg and larvae) and reducing impingement mortality. A detailed evaluation regarding the potential of this technology to meeting the impingements and entrainment requirements of Section 316(b), *California Once-Through Cooling Policy* are described below. This evaluation was supported by reviews of the available literatures and studies of fish and larvae abundance and distribution along the California Coast.

4.2.1 Fish and Larvae Distribution

A systematic assessment of the temporal and spatial patterns of nearshore distribution and abundance of pelagic fishes off southern California coast was conducted by Allen and DeMartini (Allen and DeMartini, 1983). Pelagic fishes were sampled at 2 longshore locations between San Onofre and Oceanside, California, within 0.5 to 3.0 kilometers of shore from September 1979 to March 1981. Samples were taken at randomly chosen positions within each of three depth blocks (strata) during day and night periods (Allen and DeMartini, 1983). The three depth blocks selected for the study are: 5-11 meters (shallow), 12-16 meters (mid) and 18–27 meters (deep). California Anchovy dominated the catch and accounted for approximately 81 percent of the all fish caught. The remainder of the catch consisted primarily of queenfish, white croaker, and Pacific pompano. The observed monthly variation in total number of individual fishes captured during the day and night in each of the three depth blocks over the study period indicated that day and night catches of total individuals varied among depth blocks throughout the study. Day catches were consistently highest at 5 to 11 meter depths, but the variability in catches was high. Night catches did not differ from day catches in shallow depth block. However, night catches were higher and less variable than day catches in both the 12-16 meters and 18–27 meters depth blocks. More importantly, the observations suggested that there is no discernable trend of decline in fish abundance with distance and depth offshore with the study extent, that is, to 27 meters (approximately 90 feet) of water depth.

Another study that provided information on the water depth-distribution relationship focused on the California halibut, which is one of the most important flatfishes to recreational and commercial fisheries in nearshore waters of central and southern California (Fish Bulletin 174, 1990). The halilbut has over 20 subspecies, occurring at depths from the shoreline in bay nursery grounds and the surf zone to 185 meters (600 feet). However, approximately 98 percent of its occurrences in otter trawl (7.6 meter headrope) surveys in southern California are from depths less than 60 meters (200 feet). Adults are most abundant at depths less than 20 meters (66 feet) and occur most frequently at depths less than 30 meters (98 feet) (Fish Bulletin 174, 1990). Halibut eggs are 0.7–0.8 millimeters in diameter and are most abundant in the water column close to shore. Eggs were previously thought to be demersal, but are now known to be pelagic. Halibut larvae hatchlings are approximately 2.0 millimeters and then metamorphose (and settle) at 7.5–9.4 millimeters. They metamorphose at an age of approximately 20–29 days. The larvae are pelagic; occur most commonly in the water column between the 12 meter (40 feet) and 45 meter (148 feet) isobaths.

Temporal and spatial abundance patterns of the larvae of California halibut were investigated (by H. G. Moser and W. Watson) using a 30-year-long (1951–81) CalCOFI data set that included stations from central California to southern Baja California, and an 8-year-long (1978–86) nearshore data set from two sites in the vicinity of San Onofre, California (Fish Bulletin 174, 1990). Nearshore samples were collected from January 1978 through September 1986 along a transect line perpendicular to shore approximately 1 kilometer south of SONGS, and from August 1979 through September 1986 along a similar transect off Stuart Mesa, approximately 17 kilometers south of the SONGS transect.

The study found that mean abundance (number under 10 meters of sea surface) and density (number per 100 cubic meters) of larval California halibut were highest between the 12-meter and 45-meter isobaths. For instances, yolk-sac larvae tended to be most abundant in the depth block of 22 to 45-meter depth and least abundant in the shallow block of 6-9 meter and deeper block of 45-75 meter. Preflexion larvae were significantly more abundant in 12-22 meter and 22-45 meter depth blocks than elsewhere, and tended to be least abundant in shallow blocks of 6-9 meter and 9-12 meter. Flexion stage larvae were distributed similarly, except that only the relatively high abundance in 22-45 meter was statistically distinguishable from the very low abundances in 6-9 meter and 9-12 meter. Abundances of postflexion larvae also tended to be higher in midwater depth blocks of 12-22 meter and 22-45 meter.

In summary, the California halibut study indicates that there is no evidence to support that abundance of both adult and larval fish will decline with the depths or distances offshore considered in this cooling technology assessment.

4.2.2 Fish Behavior at Intake Structures

In addition to the background variability and distribution of fish abundance in the source water, the natural behavior of fish will also impact the effectiveness of an intake technology ability to reduce entrainment.

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

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

4.2.3 Entrainment

As described in Sections 4.2.1 and 4.2.2, the fish and fish larvae are present for a wide range of water depths and distances offshore of SONGS and the fish can be attracted to the intake due to its behavioral characteristics. Review of fish and larval abundance studies referenced above indicate that there is no clear evidence to support that withdrawal from a deep sea location will achieve the entrainment reduction required under the Section 316(b), *California Once-Through Cooling Policy* rules.

4.2.4 Impingement

The relocation of the offshore velocity caps to a deeper location does not in itself demonstrate compliance of the Section 316(b), *California Once-Through Cooling Policy* rules. Compliance with the impingement reduction requirement will likely require the deepwater offshore velocity caps to be designed with a 0.5 fps or lower, while a new shoreline screen house and pump structure may also need to consider a low through-screen velocity, of 0.5 fps or lower. Addition of a fish handling and return system with an offshore intake setting will be required to further reduce impingement mortality and avoid fish entrapment.

4.2.5 Summary and Impacts

As stated in this section:

- At SONGS, different fish species and life stages are present in a wide range of water depths.
- The highest abundance of most stages of California halibut larvae occurs in water depths of 22 meter (similar to the depth of the proposed intake velocity caps for this evaluation) to 45 meters.
- The deep sea offshore velocity caps will likely attract the reef species as well as other types of fish that pass the structure on a random basis and become entrained into the system.
- The deepwater velocity cap will need to be sized for a 0.5 fps intake velocity to satisfy the impingement reduction criteria, and the shoreline intake structure may need to be sized for a low through-screen velocity, such as 0.5 fps or lower to further reduce impingement. The addition of a fish-handling and return system with an offshore return capability will be required to avoid fish entrapment in the onshore pump intake.

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

4.3 Environmental Offsets

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 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 broadly based, multidisciplinary review process, which supports a more flexible approach to using environmental offsets to generate the maximum net environmental benefit.

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

4.3.2 Detailed Evaluation

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

- **Small:** Environmental effects are not detectable or are minor such 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 DW-2.

Air

The air quality impacts associated with installation of the deepwater 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 offshore marine work. 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, but there may be some emission sources on temporary offshore platforms or barges. Construction supplies, new velocity cap materials, and piping-related equipment deliveries may be significant in the early phases of construction.

The deepwater intake system may result in a moderate decrease in overall SONGS overall plant efficiency, due to increased pumping power demands associated with more distant offshore intake location. The resulting power reduction is not expected to produce any tangible increase in greenhouse gas or other pollutant emissions from replacement fossil power sources.

Surface Water

Deepwater intake system construction activities are primarily marine-based and they have the potential to generate significant water quality impacts. Installation of the new 18-foot-diameter pipeline and velocity caps will result in substantial dredging of the along the route (over 13,000 feet long per unit) generating significant turbidity impacts from disruption of the local seabed—a potentially large negative construction impact since cut and fill practices are used. These construction efforts are not expected to result in any land-based disturbance or storm water-related impacts.

The deepwater intake system will not change the overall cooling water withdrawal or discharge rates.

Groundwater

Given the primarily offshore construction environment associated with the installation of the deepwater intake system, no significant additional groundwater resources will be needed.

The deepwater 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 related materials will be generated during the outage. Marine dredge spoils are expected to be considerable. The final disposition of these materials has not been determined. Most of the piping and old velocity cap 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.

While operation of the deepwater intake system may include self-cleaning capability, physical inspection and cleaning of the velocity cap have the potential to generate additional biological wastes (vegetative debris). Collection and disposal of these marine wastes represent a small operational negative impact.

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 impacts from construction activities for the deepwater intake system are not expected to be significant for land-based locations, since the primary work areas will be well offshore. Buffer areas around offshore construction zones will likely be established for safety reasons, but which will also serve to reduce noise impacts to offshore noise receptors (watercraft) and shoreline recreational areas (for example, San Onofre State Beach). Given the remaining potential for noise impacts to the public along the immediate shoreline recreational areas, the construction activities could pose a small negative impact.

Operational noise levels are expected to be largely unchanged following installation of the new offshore screening system.

Land Use

Construction activities associated with the deepwater intake system are primarily offshore (significant onshore activities on building a new pump house onshore to have a deeper pump forebays) and these activities will likely 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 deepwater intake system modules and associated piping (assuming surface placement) will obviously represent a modest change in land use in those previously natural subaqueous areas that now host the old velocity cap and associated piping. The new velocity cap will be located in even deep waters and therefore should not represent an impediment to surface navigation. However, the modules locations may be marked with surface buoys to preclude deepwater activities. Given these impacts, operation of this underwater system is expected to offer a small term negative impact.

Marine Ecological Resources

Deepwater intake system construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the new 13,000 feet long offshore pipe and velocity caps the cut and fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a considerable area of marine habitat area—a very large negative impact considering two units construction.

While the deepwater intake system may further reduce the impingement impacts typically associated with once-through systems because of its location in deeper and potentially less biological productive area, the current SONGS once-through system already employs some technologies (offshore velocity cap, angled in-shore traveling screens), which serve to reduce these impacts. While the deepwater intake will not, by itself, reduce the overall water withdrawal or discharge rates, its deeper location again may serve to reduce en-trainment impacts if this location proves to be a less biologically rich environment. The thermal discharge impacts to aquatic life will remain largely unchanged. Consequently, this system is expected, operationally, to offer a small positive impact relative to the current condition.

Terrestrial Ecological Resources

Construction activities associated with the deepwater intake system are primarily marine-based and conse-quently present little or no impact to land areas. There will be little or no construction impacts to terrestrial natural habitat areas or areas with significant ecological value or sensitivity. Operation of the deepwater in-take system will similarly present no new threat to these resource areas.

Cultural and Paleontological Resources

Since installation of the deepwater intake system will be primarily confined to subaqueous lands, there is lit-tle 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 deepwater intake system will be submerged and present no permanent change in external profile of the facility.

Transportation

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

Operationally, the deepwater intake system is not expected to increase maintenance and service requirements for the deeper velocity cap. Consequently, there should be no operational transportation impacts for this sys-tem.

Socioeconomic Issues

While there will be some additional construction-related employment opportunities associated with the 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 DW-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 deepwater offshore intake screen system. The construction impacts could be characterized as having moderate to large negative impact significance based on the nature of the installation method of cut and fill. The construction practices will involve significant marine-based work, which will generate increased turbidity in the seawater near construction areas, produce a sizeable marine spoils waste, and result in permanent and temporary losses of marine habitat. Theses impacts are not offset by the limited employment opportunities that may be gained during this same period.

Operationally, there may be a small positive impact significance (reduction of impingement and entrainment impacts) related to the placement of the new velocity caps in deeper, more distant water, if this area proves to be less biologically productive. There is no coincident reduction of cooling water withdrawals, so there is no change in thermal discharge impacts. Overall, the small benefits associated with reductions of impingement and entrainment impacts appear to be outweighed by the significant (large) impacts associated with the disruption of the marine habitats and associated water quality degradation when the cut and fill construction practices are employed.

4.4 First-of-a-Kind to Scale

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 detail in Section 4.2, there is no advantage of relocating the offshore intake to deeper more distant location, since the population of a variety of fish and larvae are present in a wide range of water depths. Even though construction of two new 18-foot-diameter, 13,000-foot-long offshore intake pipes and associated new offshore velocity caps and a new onshore new pump intake structure are potentially feasible, this combined strategy would be pushing the limit of hydraulic design for large flow intake systems. Major challenges are likely regarding the construction and maintenance of such a long and deep (large capacity) offshore system. There is no definitive evidence to demonstrate that the required reductions in entrainments can be achieved with this relocation to a deeper intake site alone. While impingement reduction rule can be satisfied, there is no clear advantage over other technology, such as wedge wire screens. When considering the environmental impacts from the associated significant disturbance to the local marine environment the relocation of the existing intakes to a deeper, more distant offshore location is not expected to produce any noticeable benefits regarding entrainment. Consequently, this option should not be candidate for further evaluation in the next phase of the assessment.

6. References

Allen, L.G., DeMartini, E.E., Temporal and Spatial Patterns of Nearshore Distribution and Abundance of the Pelagic Fishes off San Onofre-Oceanside, California, Fishery Bulletin, Vol 81, No. 3, 1983

Annicchiarico, J., San Diego Air Pollution Control District (personal communications, April 6, 2012)

ASCE, Design of Water Intake Structures for Fish Protection, Prepared by the Task Committee on Fish-Handling Capability of Intake Structures of Hydraulic Division, 1982

Bishop, J., Policy on Use of Coastal and Estuarine Waters for Power Plant Cooling – CalEPA, SWRCB, 2011

DeLeon, J., California State Lands Commission (personal communications, April 16, 2012)

Detmer, A., California Coastal Commission (personnel communications, April 17, 2012)

Enercon, Design of Large Organism Exclusion Device for San Onofre Nuclear Generating Station Units 2 and 3, May 2012.

Enercon Services, Inc., Feasibility Study for Installation of Cooling Towers at San Onofre Nuclear Generating Station,

EPRI, *Comprehensive Demonstration Study for Southern California Edison's San Onofre Nuclear Generating Station*, January 2008.

Fish Bulletin 174, The California Halibut, Paralyichthys californicus, Resource and Fisheries, Department of Fish and Game, The Resources Agency, State of California, 1990.

Government of Western Australia (GWA), Environmental Offsets Position No. 9, January 2006

Helvey, Mark, Behavioral Factors Influencing Fish Entrapment at Offshore Cooling-Water Intake Structures in Southern California, Marine Fisheries Review 47(1), 1985a.

Helvey, Mark, Influence of Habitat Structure on the Fish Assemblages Associated with Two Cooling Water Intake Structures in Southern California, Bulletin of Marine Science 37(1), 1985b.

Jauregui, R., State Water Resources Board (personnel communications, May 2, 2012)

Lambert, J., US Army Corps of Engineers (personal communication, April 11, 2012)

Luster, T., California Coastal Commission (personal communication, April 17, 2012)

Mache, Manon, San Diego County Department of Environmental Health (personal communications, May 1, 2012)

Morris, R., San Diego Regional Water Quality Control Board (personal communications, April 19, 2012)

Oggins, C., California State Lands Commission (personal communications, April 16, 2012)

Rannals, L., USMC, Camp Pendleton (personnel communication, April 3, 2012)

SONGS, 2004. Saltwater Cooling System, System Description, Rev. 7

SONGS, 2008, Circulating Water System Description, SD-S023-280, Revision 14

Tetra Tech, California's Coast Power Plants: Alternative Cooling System Analysis, Section N. San Onofre Nuclear Generating Station, 2008

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

7. Sketches

Figures DW-.1 through DW-3 provide the conceptual arrangement for a typical offshore deepwater intake at SONGS.

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the deepwater intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Department of Navy and United States Marine Corps – Camp Pendleton Lease	Not applicable - USMC 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 deepwater system will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – US Army Corps of Engineers (USACE)	Installation of the deepwater intake system, either via cut and fill processes will generate significant impacts to Waters of US and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – US 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 – US Army Corps of Engineers	Not applicable - the installation of the deepwater intake system will generate significant impacts to Waters of US that cannot be addressed by the Nationwide permitting process.	Not applicable	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the deepwater offshore intake system poses significant impacts marine habitat and aquatic life and may also serve to further reduce operational entrainment losses.	Connected to CEQA process	NA	NA
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA), Permanent Facilities	Not applicable - the addition of the addition of the deepwater intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable - the addition of the deepwater intake system will not demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Not applicable - superseded by Department of Navy lease arrangement with SONGS. The addition of the deepwater intake system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA
California Public Utility Commission (CPUC) Approval	CPUC will likely be the Lead Agency for the California Environmental Quality Act (CEQA) review process regarding the proposed deep offshore intake 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 deepwater offshore intake will not result in a net power capacity (increase) > 50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable because of the considerable offshore and near shore development within the coastal zone While there are no specific fatal flaws with the deepwater intake system, the significant construction related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the deepwater intake system, the significant construction related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct (ATC) – San Diego Regional Air Pollution Control District	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTO) – San Diego Air Pollution Control District	Not applicable - the deepwater offshore intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	Not applicable - the deepwater offshore intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable - the deepwater offshore intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – construction of the deepwater offshore intake system expected to disturb little or ground surfaces and so there is little potential to generate significant dust emissions. The deepwater intake system, itself, will not generate any additional air emissions.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
NPDES Industrial Discharge Permit – Regional Water Quality Control Board (RWQCB) and State Water Resources Board	The deepwater intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent (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 – construction of the deep offshore intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (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 – construction of the deep offshore intake system is not expected to 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 deep offshore intake 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

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Department of Fish and Game Department (CDFG)	The installation of the deepwater intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game (CDFG)	Not applicable – the addition of the deepwater offshore intake system will not results 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 addition of the deep offshore intake 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 offshore deep offshore intake system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health - California Unified Program Agency	Installation of the deep offshore intake system 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, USEPA, San Diego County Department of Environmental Health - California Unified Program Agency	Not applicable – the addition of the deepwater intake system 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

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Diego County Department of Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the addition of the deepwater intake system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 - San Diego County Department of Environmental Health - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (e.g., 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 (US Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California States Lands Commission.	Not applicable	NA	NA
Conditional Use Plan Amendment - San Diego County Department of Planning and Land Use	Not applicable - the SONGS property is entirely situated on federal property (US Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California States Lands Commission.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 (US Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California States Lands Commission.	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 (US Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California States Lands Commission.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable because the SONGS property is entirely situated on federal property (US Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California States Lands Commission.	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 deep offshore intake components and associated piping are expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable - the deep offshore intake components and associated piping are expected to be oversized.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 - the installation of the deepwater intake system is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The addition of deepwater intake system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan.	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable - No new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the addition of deepwater intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake System
San Onofre Nuclear Generating Station

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 SONGS generation during the plant outage to install the new deeper velocity cap system.	While the deepwater intake system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the subaqueous lands.	Operational cooling water withdrawal and discharge rates will be remain largely unchanged.	Not applicable	Large Negative	None
Groundwater	No additional ground water resources will be needed to support construction.	No additional ground water resources will be needed to support operations.	Not applicable	None	None
Waste	Significant marine sediment wastes will be generated to facilitate installation of the additional offshore piping system.	No increase in waste generation is expected from maintenance activities on the new velocity cap system in deeper water.	Marine Spoil Wastes (pending subsequent assessment phase)	Moderate Negative	None

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake System, San Onofre Nuclear Generating Station

San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and shoreline recreational areas, but there is the potential for impacts to the shoreline areas.	Operational noise levels are expected to be largely unchanged as a result of the deepwater intake system.	Noise impacts above the 70 dBA threshold value may occur along shoreline during construction.	Small negative	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters.	The deepwater intake system and associated piping represent a change in land use of the marine bed and could preclude some waterborne activities.	(pending subsequent assessment phase)	Small negative	Small negative
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat).	Could reduce impingement and entrainment impacts (if the deeper location proves to be a less biologically active zone). Some mitigation offered by existing system. Overall water withdrawal or discharge rates are unchanged so thermal discharge impacts to aquatic life will remain largely unchanged	Marine bed area disturbed (pending subsequent assessment phase)	Large Negative	Small Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of cultural or paleontological resources.	Not applicable	None	None

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake System, San Onofre Nuclear Generating Station
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Visual Resources	All construction equipment will be low profile, i.e., not extend above the height of local facility structures.	The deepwater intake system will be submerged and present no permanent change in external profile of the facility.	Not applicable	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The deepwater intake system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce – Level of Service (pending subsequent assessment phase)	Small Negative	None
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (e.g., housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the deepwater intake system.	Workforce (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact of Significance

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

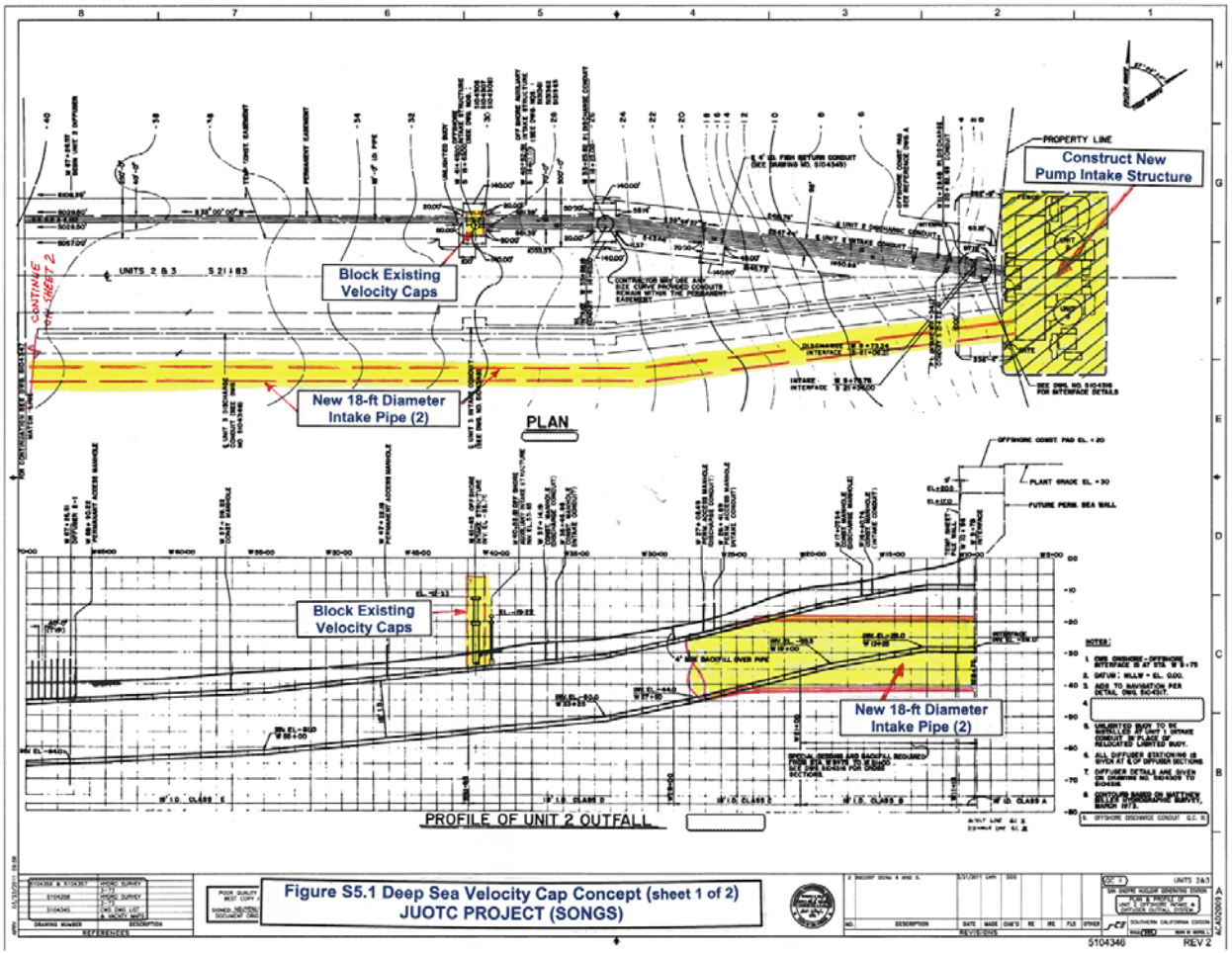

Figure DW-1. *Deep Sea Velocity Cap Concept (1 of 2)*

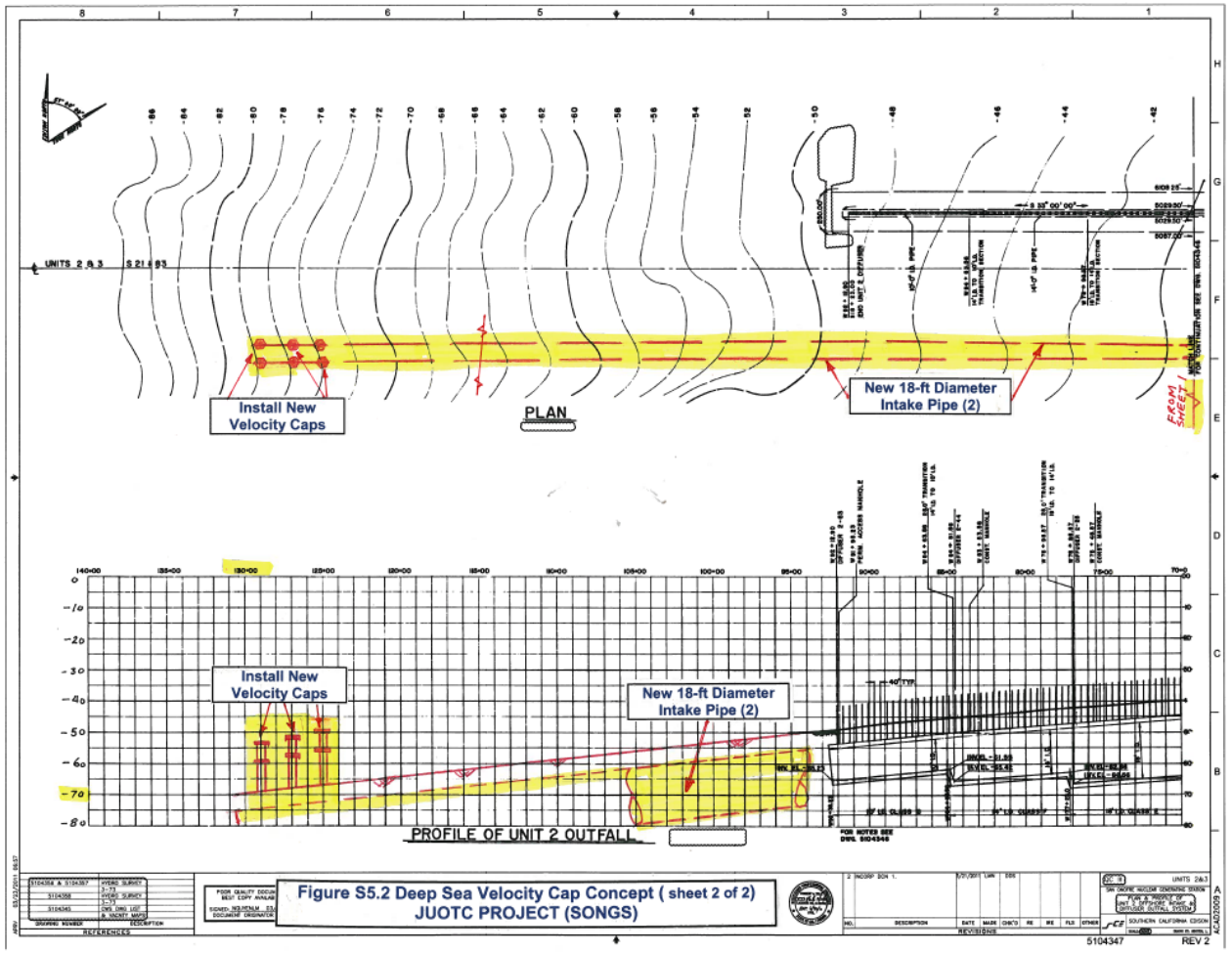

Figure DW-2. *Deep Sea Velocity Cap Concept (2 of 2)*

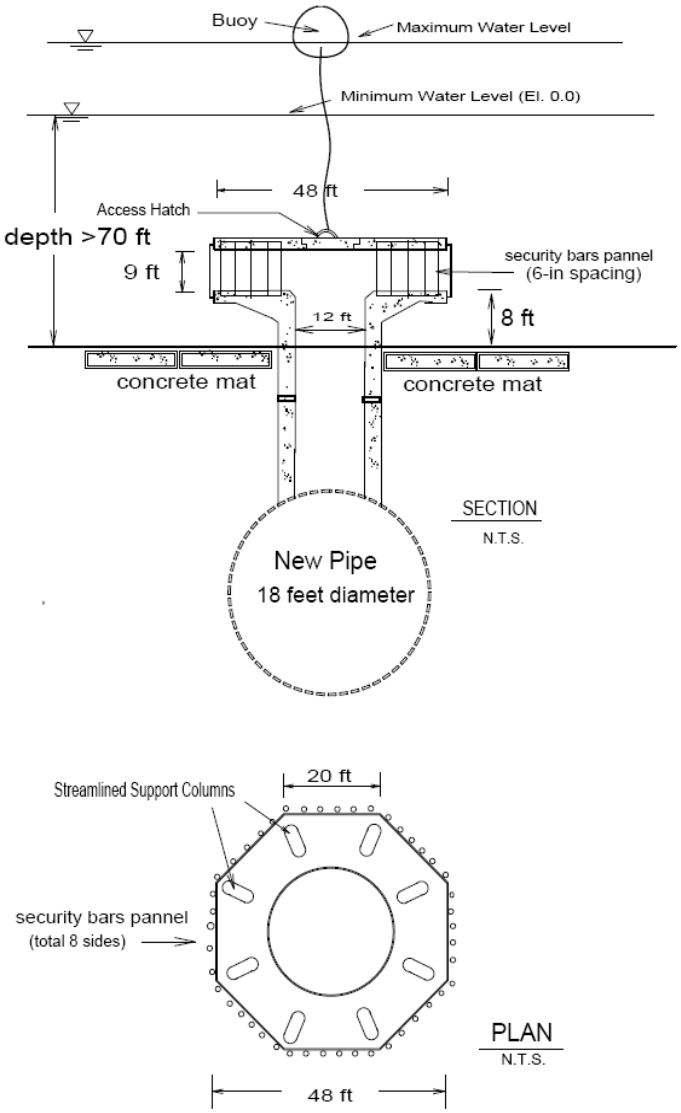

Figure DW-3. *Deep Sea Velocity Cap Intake Concept*