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

Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling System for San Onofre Nuclear Generating Station

Prepared by Bechtel Power Corporation

Report No. 25761-000-30R-G01G-00009 Rev. 2

November 5, 2012

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Revision	Date	Affected Sections
0	September 14, 2012	Initial Issue
1	October 12, 2012	Correct several formatting issues and provide additional details in the TOC and Sections 3.6.2, 3.6.3, 3.8.1, 4.1.1.1, 4.1.1.2, 4.1.2, 4.2.5, 4.2.8 and 6
2	November 5, 2012	Incorporated Review Committee Comment in Sections 3.6.2, 4.2.4, and 4.2.5

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List of Abbreviations and Acronyms

APCD	(San Diego) Air Pollution Control District
ASCE	American Society of Civil Engineers
ATC	Authority to Construct (Air Pollution Control District)
BLM	Bureau of Land Management
BTA	Best Technology Available
BNSF	Burlington Northern Santa Fe
Caltrans	California Department of Transportation
CC	closed cycle *(figure number prefix)*
CCC	California Coastal Commission
CCS	closed-cycle system
CDFG	California Department of Fish & Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
DW	deepwater *(figure number prefix)*
EIR	Environmental Impact Report
EPCRA	Emergency Planning and Community Right-To-Know Act
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
fps	foot per second
gpm	gallons per minute
GWA	Government of Western Australia
IFMS	inshore fine mesh screens *(figure number prefix)*
IR	intake relocation *(figure number prefix)*
mgd	million gallons per day
NCTD	North Coast Transit District Railway
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NYSDEC	New York State Department of Environmental Conservation
OHP	Office of Historic Preservation
OTC	once-through cooling
PTO	Permit to Operate (Air Pollution Control District)
RCRA	Resource Conservation and Recovery Act
SCE	Southern California Edison
SDRWQCB	San Diego Regional Water Quality Control Board
SLC	State Land Commission
SONGS	San Onofre Nuclear Generating Station

List of Abbreviations and Acronyms *(cont.)*

SPCC	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWS	source water substrate *(figure number prefix)*
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USMC	U.S. Marine Corps
VOC	volatile organic compounds
WDR	Waste Discharge Requirement
WW	wedge wire *(figure number prefix)*

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1. Executive Summary

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

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

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

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

These criteria are:

- First-of-a-kind to scale
- External approval and permitting (nonnuclear licensing)
- Operability general site conditions
- Impingement/entrainment design
- Offsetting environmental impacts
- Seismic and tsunami issues
- Structural
- Construction
- Maintenance

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

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

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

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

- Wet cooling using seawater for makeup in closed-cycle cooling systems
- Deepwater offshore intake
- Initial intake relocation
- Operational strategies to reduce impingement and entrainment
- Source water substrate filtering/collection systems
- Variable speed cooling water pumping systems

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

- Closed-cycle cooling systems (except for wet cooling using seawater for makeup)
- Inshore mechanical (active) intake fine mesh screening systems
- Offshore modular wedge wire

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

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

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

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

These related permits are all expected to be challenging and lengthy, given that most will be aligned with the CEQA/Environmental Impact Report review process. The primary issue of concern will be determining the construction impacts to the sensitive and productive marine habitats associated with the once-through cooling technologies and the balance of the land usage, visual, and plant electrical power output-against further reductions in impingement and entrainment impacts that are already partially mitigated by the existing intake system.

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

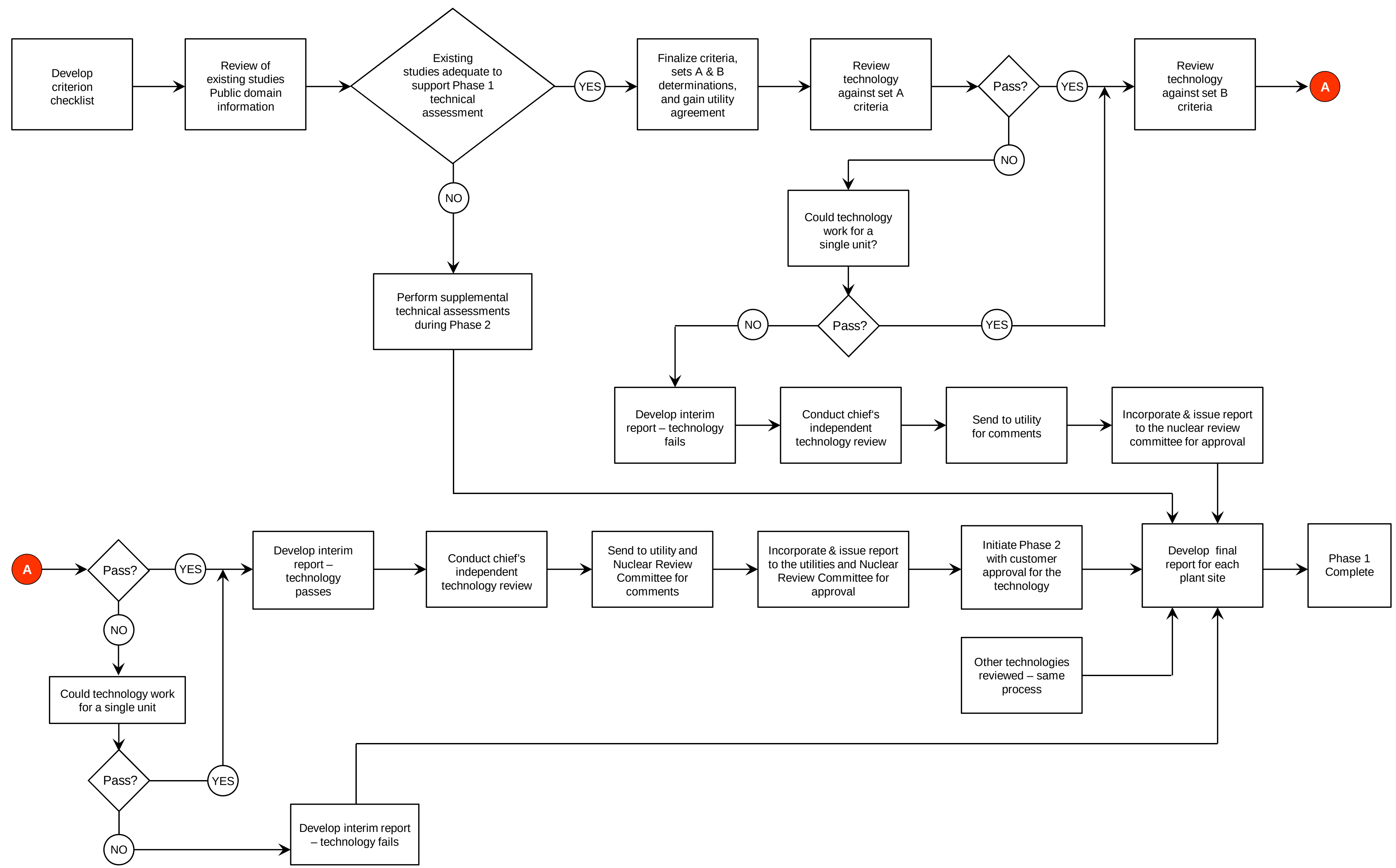


Figure 1-1. Phase 1 Review Process for Each Technology.

Table 1-1. Overall Conclusions

CRITERIA	STATUS											
Technology	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling	Deepwater Offshore Intake	Initial Intake Relocation	Inshore Mechanical (Active) Intake Fine Mesh Screening Systems	Offshore Modular Wedge Wire or Similar Exclusion Screening Systems	Operational Strategies to Reduce Impingement and Entrainment	Source Water Substrate Filtering/Collection Systems	Variable Speed Cooling Water Pumping Systems
External Approval and Permitting	No fatal flaws	No fatal flaws.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/ freshwater towers.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/freshwater towers.	Fatal flaw for saltwater towers associated with lack of sufficient PM-10 emission offsets. No fatal flaws for reclaimed/freshwater towers.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.
Impingement/ Entrainment Design	Satisfies Section *California Once-Through-Cooling Policy* criteria requirements.	Satisfies Section *California Once-Through-Cooling Policy* criteria requirements.	Satisfies Section *California Once-Through-Cooling Policy* criteria requirements.	Satisfies Section *California Once-Through-Cooling Policy* criteria requirements.	Satisfies Section *California Once-Through-Cooling Policy* criteria requirements.	Studies have shown that the entrainment will not be improved for this design, so this is considered not viable.	The impingement/ entrainment will be substantially worse for this design, so this considered a fatal flaw.	No fatal flaws, but a supplementary screen house will be required.	No fatal flaws, but the technology's effectiveness regarding entrainment impact mitigation needs better characterization.	Cannot satisfy *California Once-Through-Cooling Policy* criteria requirements.	No fatal flaws.	Cannot satisfy *California Once-Through-Cooling Policy* criteria Track 1 requirements.
Environmental Offsets[1]	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	Some negative impacts, no fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Weak overall net positive benefit.	No fatal flaws.	Weak overall net positive benefit.
First-of-Kind-to-Scale	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Not evaluated.	No fatal flaws.	No fatal flaws.	Not evaluated.	Fatal flaw – This technology has not been used for a water supply system of this size and is impractical.	Not evaluated.
Operability of General Site Conditions	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Not evaluated.	No fatal flaws.	No fatal flaws.	Not evaluated.	Low reliability and ever-decreasing lateral efficiency make this technology a fatal flaw.	Not evaluated.
Seismic and Tsunami Issues	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Not evaluated.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaw.	Not evaluated.
Structure and Construction	Possible fatal flaw – the technology cannot fit within the plant land boundaries.	Possible fatal flaw – the technology cannot fit within the plant land boundaries.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Not evaluated.	No fatal flaws.	No fatal flaws.	Not evaluated.	No fatal flaws.	Not evaluated.
Maintenance	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	No fatal flaws.	Not evaluated.	Not evaluated.	No fatal flaws.	No fatal flaws.	Not evaluated.	No practical maintenance program causes it to be a fatal flaw.	Not evaluated.
Conclusion	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review (only with fresh or reclaimed water).**	**Technology is a candidate for Phase 2 review (only with fresh or reclaimed water).**	**Technology is a candidate for Phase 2 review (only with fresh or reclaimed water).**	**Technology is not a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**	**Technology is not a candidate for Phase 2 review.**

Note:
1. *Environmental Offsets* refers to broad environmental subject matter – not the specific air emission offsets addressed in the external approval and permitting criterion.

2. Background and Introduction

2.1 Purpose/Scope of Study

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

This report describes the detailed evaluation of five closed-cycle cooling system technologies for SONGS based on the list of site-specific criteria approved by the Nuclear Review Committee. The technologies evaluated were:

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

These technologies are described in detail in Section 3. The evaluation process includes critical review of published data and literature, consultation with permitting agencies, and technical assessment supported by engineering experience and judgment. Engineering definitions were provided for each of the technologies studied, and conceptual design information was used to perform the criteria review for each. This included developing differential operating requirements for each technology option including the technology's power and water requirements as well as identifying and compiling the industry experience, reliability, and uncertainties of each technology. No new field data was collected as part of this effort. The results of the evaluation are used to characterize the feasibility of the technology and its possible selection as a candidate for further investigation in a follow-up phase of this study (Phase 2).

2.2 Regulatory History

2.2.1 Federal

The U.S. Environmental Protection Agency (USEPA) has proposed standards to meet its obligations under Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. Specifically, this section requires that NPDES permits be used for facilities with cooling water intake structures to ensure that the location, design, construction, and capacity of the structures reflect the *Best Technology Available* to minimize the harmful impacts on the environment. These impacts are associated with the significant withdrawal of cooling water by industrial facilities that remove or otherwise impact significant quantities of aquatic organisms present in the waters of the United States. Most of the impacts are to early life stages of fish and shellfish through impingement and entrainment. Impingement occurs when fish and other aquatic life are trapped against the screens when cooling water is withdrawn, resulting in injury and often death. Entrainment occurs when these organisms are drawn into the facility where they are exposed to high temperatures and pressures—again resulting in injury and death (USEPA, 2011).

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

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

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

The Section 316(b) Phase II final rule was scheduled to be issued on July 27, 2012, but the USEPA has secured an additional year to finalize the standards for cooling water intake structures. The USEPA is working to finalize the standards by June 27, 2013. When the final rule becomes effective, it is likely to include an implementation timeline that would drive the implementation of technologies to address the impingement requirements within 7 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 *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* 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 (commensurate with closed-cycle wet cooling) and velocity to 0.5 fps (through screen) or below – Track 1, or

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

This policy is being implemented through a so-called "adaptive management strategy," which is intended to achieve compliance with the policy standards without disrupting the critical needs of the state's electrical generation and transmission system. A Nuclear Review Committee was later established to oversee the studies, which will investigate the ability, alternatives, and costs for SONGS to meet the policy requirements. This study is a direct outgrowth of the 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, which encourages a flight response from fish close 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 trapped 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 placed 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 (Tetra Tech,). Also housed in the cooling water intake structure of each unit are four saltwater cooling pumps, each rated 17,000 gpm. These pumps are safety-related and located downstream of the traveling water screens. Operation of one pump is sufficient to supply the saltwater cooling needs for one unit. The total saltwater cooling flow needs for both units is 34,000 gpm (SONGS, 2004).

SONGS is also planning to add a "large organism exclusion device" with spacing between the exclusion bars of 9 inches, in conformance with SWRCB's *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 and 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 that collectively required facilities to implement Section 316(b) rules using professional judgment on a case-by-case basis.

2.3 Screening Process (A/B Criteria)

The technology screening process for the Phase 1 portion of the evaluation was performed by using a two-tier criteria (Criteria Set A/B) approach that achieves a technically comprehensive assessment while minimizing the time and effort required. The screening was initially performed for Set A criteria. If the technology satisfied all of the Set A criteria, it was evaluated against the Set B criteria.

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

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

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

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

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

3. Technology Description

This section describes the existing SONGS intake, then provides a description of each technology that has been evaluated as part of the Phase 1 study.

3.1 Existing Intake Description at SONGS

3.1.1 Existing Intake System

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

This offshore intake system is called the primary offshore intake system. In addition, there is an auxiliary offshore intake system for each unit, which consists of a Seismic Category I velocity cap installed on the offshore intake line, located approximately 92 feet shoreward from the primary velocity cap. The auxiliary velocity cap is to ensure constant supply of 34,000 gpm cooling water for the saltwater cooling water pumps, also housed in the onshore cooling water pump intake.

3.1.2 Existing Fish-Handling Systems

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

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

3.2 Closed-Cycle Cooling Systems

3.2.1 Background

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

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

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

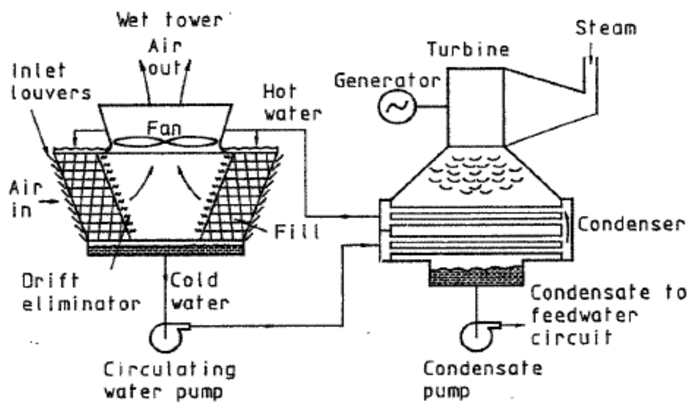


Figure CC-1. Sample Closed-Cycle System Using a Wet Mechanical (Forced) Draft Cooling Tower (Kroger, 2004)

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

The five closed-cycle technologies evaluated are:

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

Five experienced manufacturers of both wet and dry cooling systems provided input on conceptual designs for each of these technologies based on specific site design criteria. Bechtel also had discussions with each manufacturer regarding the applicability and technical feasibility of the technologies to meet the needs of SONGS. The manufacturers that provided input were Evaptech, Inc., GEA Power Cooling, Inc., Hudson Products Corporation, International Cooling Tower, Inc., and SPX Cooling Technologies, Inc.

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

3.2.2 Dry Air Cooling

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

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

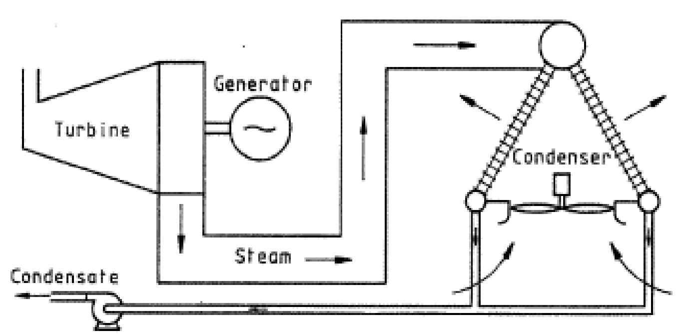


Figure CC-2. *Sample Air-Cooled Condensers (Kroger, 2004)*

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

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

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

3.2.2.1 Passive Draft Dry Air Cooling

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

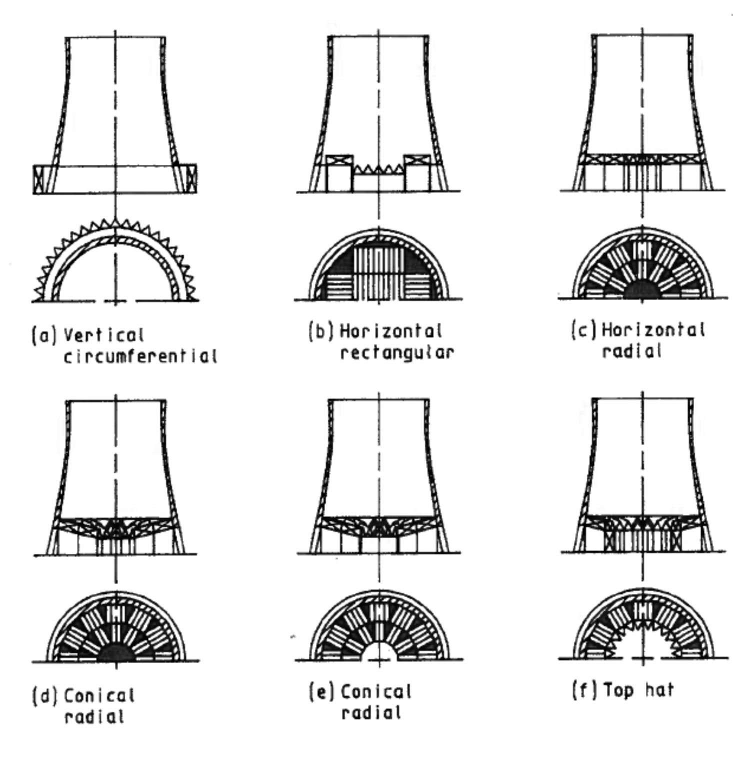


Figure CC-3. *Sample Heat Exchanger Configurations for Passive Draft Dry Air Cooling Towers (Kroger, 2004)*

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

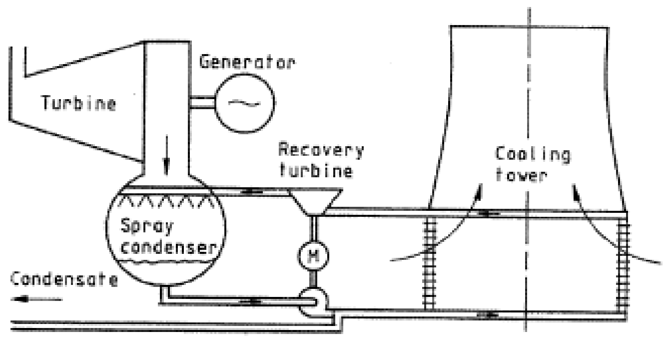


Figure CC-4. *Sample Heller System (Kroger, 2004)*

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

Based on the design requirements for the site, which are described in detail in Section 4.5, three natural draft towers per unit (six total for the site) are needed to support SONGS' operation. The towers will be approximately 610 feet in diameter and approximately 570 feet high. The towers will need to be spaced approximately a diameter distance apart to minimize the chances of the hot discharge from one tower being entrained into the intake of a nearby tower, negatively impacting the performance of the nearby tower (known as interference), or to avoid any of the towers being starved of required incoming airflow. Consequently, the towers will need to be located on the Mesa Complex. A conceptual plot plan is depicted below. It can be seen that to accommodate the large area required for this technology, certain facilities currently in the Mesa Complex will need to be relocated, or additional land will need to be leased to increase the size of the Mesa. The majority of the impacted structures are office space, warehouses, parking, and contractor living spaces. However, the Emergency Operating Facility (EOF) is located in the far northwest corner of the Mesa, and this has been identified as critical during plant emergencies. A medical building is also currently in this area next to the EOF. It is feasible to assume that the noncritical structures could be relocated. The conceptual plot plan below is meant to demonstrate the large area that would be required to accommodate the towers. A detailed layout plan will be developed during Phase 2 to try to minimize the need to lease additional land adjacent to the Mesa. To the fullest extent possible the detailed layout of the towers will be done such that the critical buildings are not impacted. The noncritical structures will be placed in the space in between towers when possible to minimize the need to lease additional Pendleton land to accommodate them. Also, the emergency road, El Camino Real, will not be encroached on. This system will not require substantial makeup water, only a small amount to make up for system losses, leakage, and water chemistry control. This water could be supplied by seawater from the current intake structure from the Pacific Ocean, by fresh or reclaimed water from nearby water treatment facilities, or by a desalinization facility.

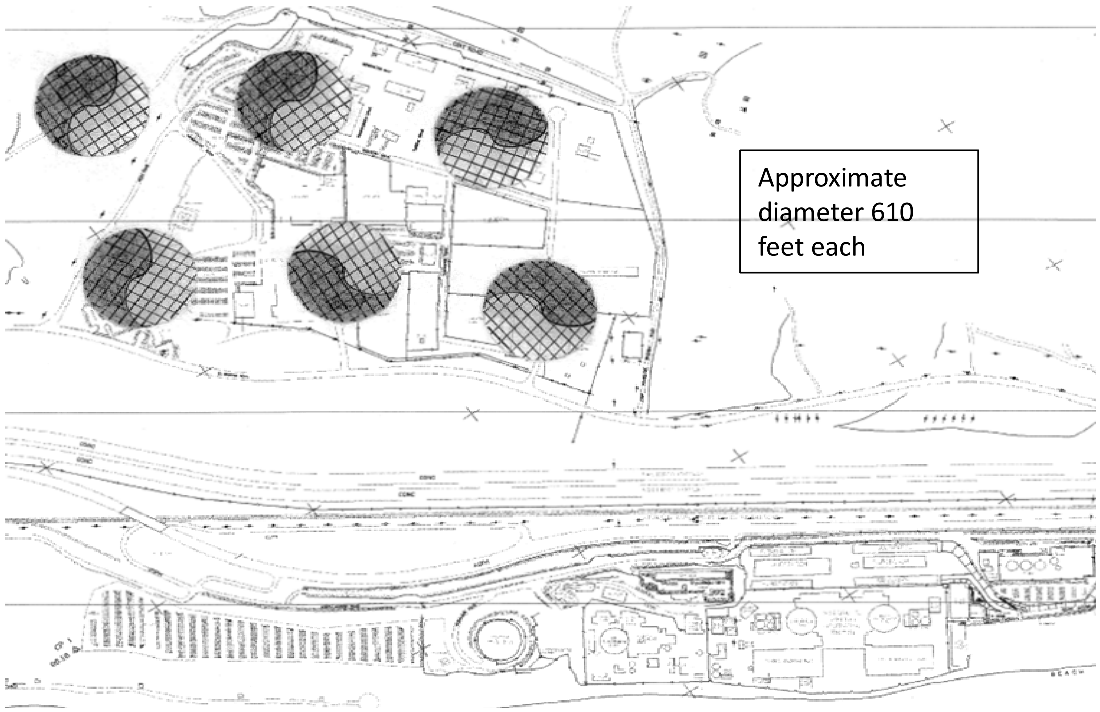


Figure CC-5. Conceptual Plot Plan Passive Draft Dry Cooling

3.2.2.2 Mechanical (Forced) Draft Dry Air Cooling

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

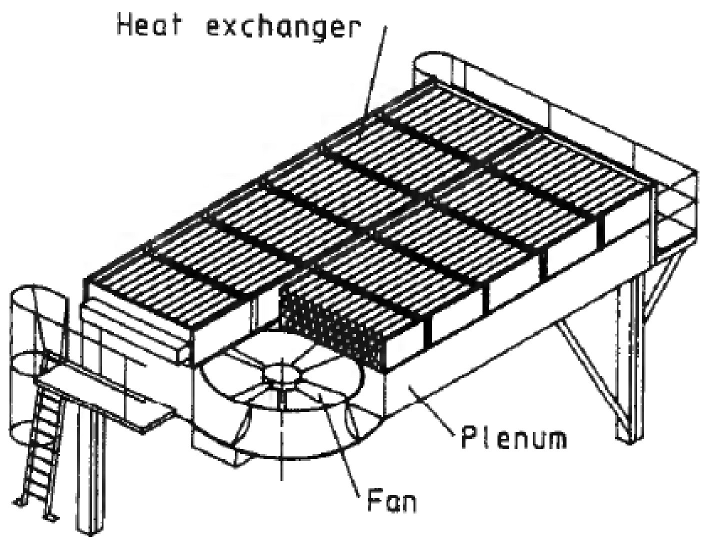


Figure CC-6. *Sample Forced Draft Tower (Kroger, 2004)*

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

To dissipate the required heat loads for the site, the mechanical (forced) draft dry air cooling tower would require approximately 1,018,400 square feet of heat exchanger area per unit and 43,700 hp (32.6 MW) input power per unit to run the fans. The towers would, consequently, need to be located on the Mesa Complex. Again, to accommodate the large area required for this dry technology, a number of facilities currently in the Mesa Complex will need to be relocated, or additional land will need to be leased to increase the size of the Mesa. To minimize the occurrence of interference between the units, these towers will be located next to each other, essentially looking like one large air-cooled heat exchanger. Manufacturers of this technology were consulted on this approach, and they agreed that this was the best layout for minimizing interference and land area requirements. To account for the fact that the towers would be placed next to each other, the manufacturers designed them with additional air inlet height to allow adequate airflow to the interior fans, and the dimensions given for this design in this report reflect this. The towers are shown with some space between them in the figure below for clarity only; they would be placed directly side by side. Virtually all of the buildings and facilities in the Mesa would need to be relocated to accommodate the towers with the exception of the EOF, which has been identified as critical, and the medical building in the northwest corner of the Mesa. Additional Pendleton property would likely need to be leased to accommodate the relocated facilities.

The noise will be limited to approximately 90 dB(A) at 3 feet from the mechanical equipment. Depending on the final location of the towers in the Mesa and any relocated buildings currently in the Mesa, adherence to far field noise limitations may be required. The optimum siting for the towers and all impacted buildings will be developed in Phase 2, and any resulting noise attenuation requirements would be considered in the tower designs and costs.

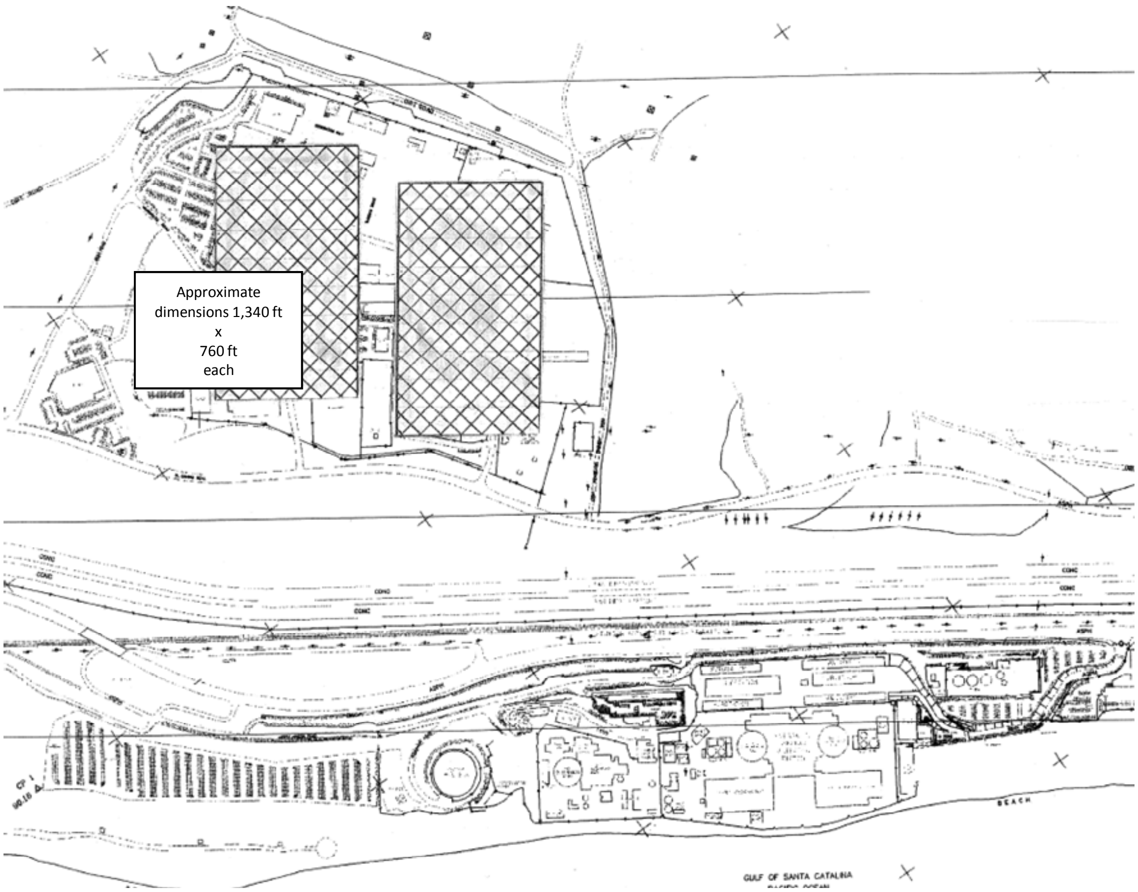


Figure CC-7. *Conceptual Plot Plan Mechanical (Forced) Draft Dry Air Cooling Towers*

3.2.3 Wet Cooling

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

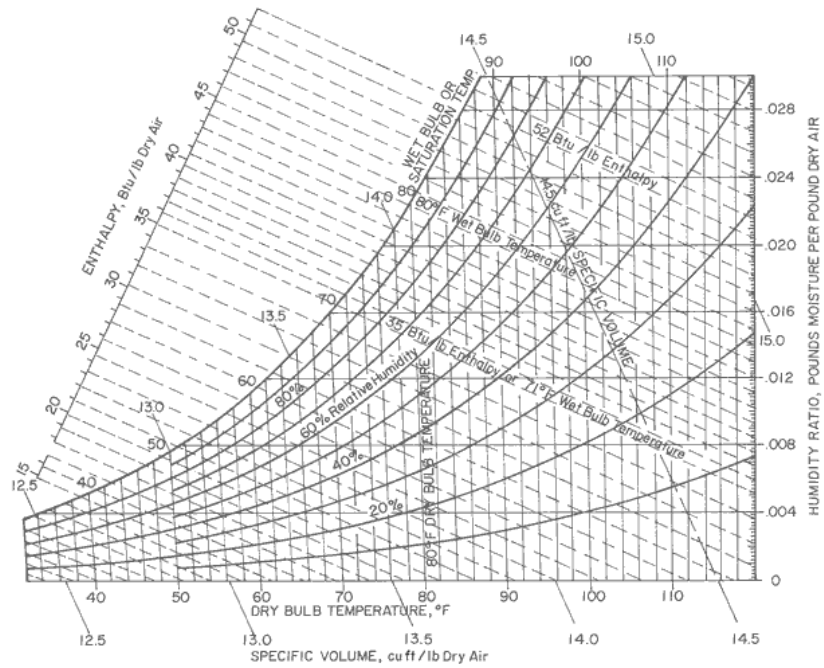


Figure CC-8. *Psychrometric Chart*

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

The wet cooling method results in exhaust air being saturated with water (the water evaporated into the air as part of the cooling process). Depending on ambient weather conditions, this saturated exhaust air can recondense as it is discharged to the atmosphere and be visible as a plume. The plume can be significant under certain ambient temperature, humidity, and wind conditions, and may appear as a continuous, thick cloud for hundreds of feet in the air and miles away from the tower. The severity and frequency of visible plume were not quantified for each of the wet technologies as part of this phase of the study, but detailed analysis will be performed as part of Phase 2 to allow full evaluation of the level of hazard this plume will present. This is an especially important consideration for the wet technologies since these towers will be located so close to the I-5 interstate highway, as depicted in the conceptual plot plans below.

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

Use of wet cooling towers at SONGS will require approximately 14,700 gallons per minute (gpm) of makeup water per unit. This number was determined by assuming that the circulating water system would be run at the highest cycles of concentration allowable while adhering to the available PM-10 emission offsets for SONGS. Running the tower at the highest cycles of concentration possible minimizes the makeup requirements to the fullest extent, but unfortunately maximizes the negative environmental impacts from the drift due to the elevated concentration of solids and chemical constituents in the drift droplets. While utility-size cooling towers have been designed, built, and operated successfully using saltwater/seawater (Maulbetsch, 2010), the source of cooling water for the wet and hybrid technologies would be fresh or reclaimed water because the available PM-10 offsets are insufficient to support tower operation using saltwater. This is described further in Section 4.3.

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

For this study, all of the wet technology towers are assumed to be located on the Mesa Complex. As can be seen from the conceptual plot plan, existing structures will likely need to be relocated or additional land will need to be leased by SONGS to accommodate towers in the Mesa. The Mesa location was assumed because the alternative layout adjacent to the plant (see possible alternative conceptual plot plan) would require using state park land, relocating a high-traffic parking lot, and encroaching into a protected fairy shrimp habitat north of the parking lot; thus, it is not feasible to assume this plant-adjacent area can be used for cooling towers. Approximately half of the noncritical structures in the Mesa would need to be relocated. When detailed tower layouts are developed in Phase 2, the possibility of fitting all of the structures on the north side of the Mesa will be investigated (by placing office buildings closer together, etc., when possible). The critical structures will not need to be moved to facilitate tower placement. However, unlike the dry technologies, the wet towers emit particulates in the tower drift that can deposit on the surrounding area, and the towers' exhaust plume can result in fog and icing conditions. Due to the considerable height of the towers, it is possible the drift particulates will be exhausted and will not deposit on the structures in the Mesa (the height and velocity of the exhaust will carry the particles over the Mesa structures and they will land and deposit outside of this area). The Seasonal/Annual Cooling Tower Impact (SACTI) model will be used in Phase 2 to characterize the concentrations of drift contaminant deposits on the ground in the Mesa area, as well as to define if and when fog and ice will be present at the ground level.

The noise will be limited to approximately 90 dB(A) at 3 feet from the air inlets as well as the mechanical equipment. As stated earlier for the mechanical draft dry designs, any necessary noise attenuation requirements and the associated tower design and cost impacts will be determined during Phase 2 work.

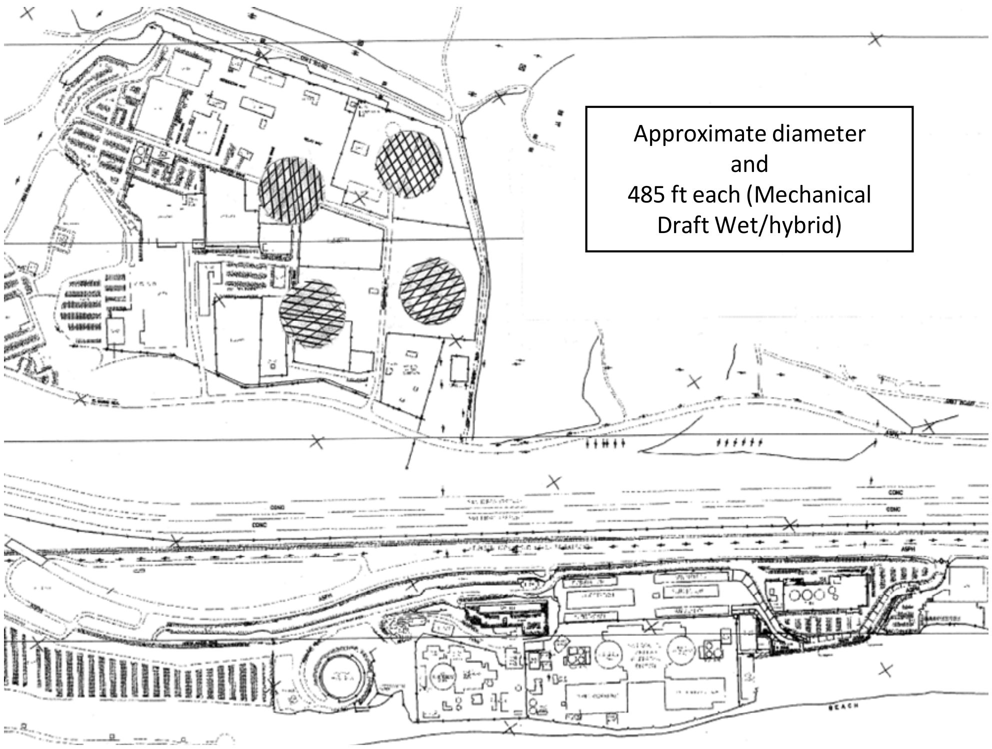


Figure CC-9. *Conceptual Plot Plan for Wet Closed-Cycle System Technologies (Wet Natural Draft Cooling, Wet Mechanical (Forced) Draft Cooling, Hybrid)*

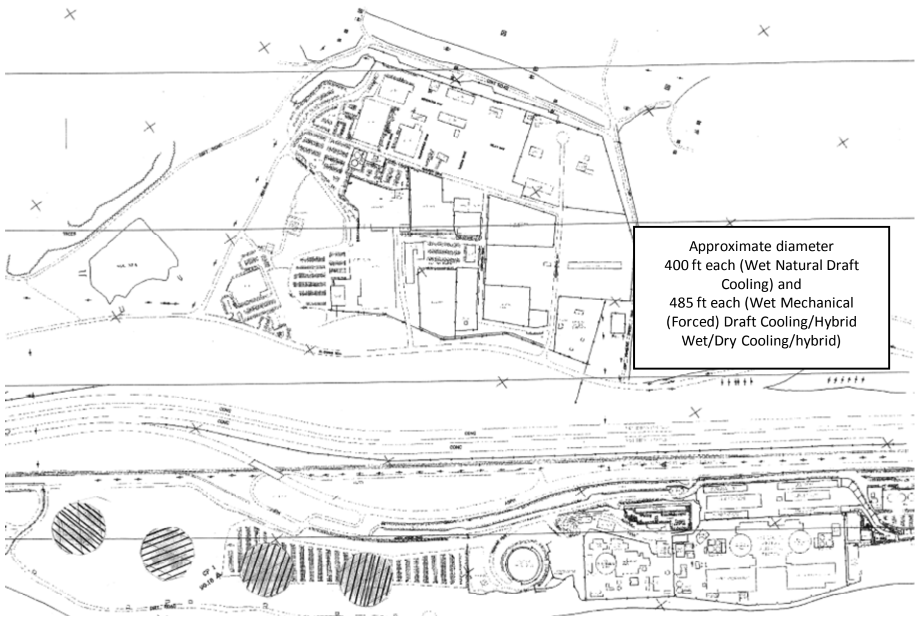


Figure CC-10. *Possible Alternative Conceptual Plot Plan for Wet Closed-Cycle System Technologies (Wet Natural Draft Cooling, Wet Mechanics [Forced] Draft Cooling, Hybrid)*

3.2.3.1 Wet Natural Draft Cooling

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

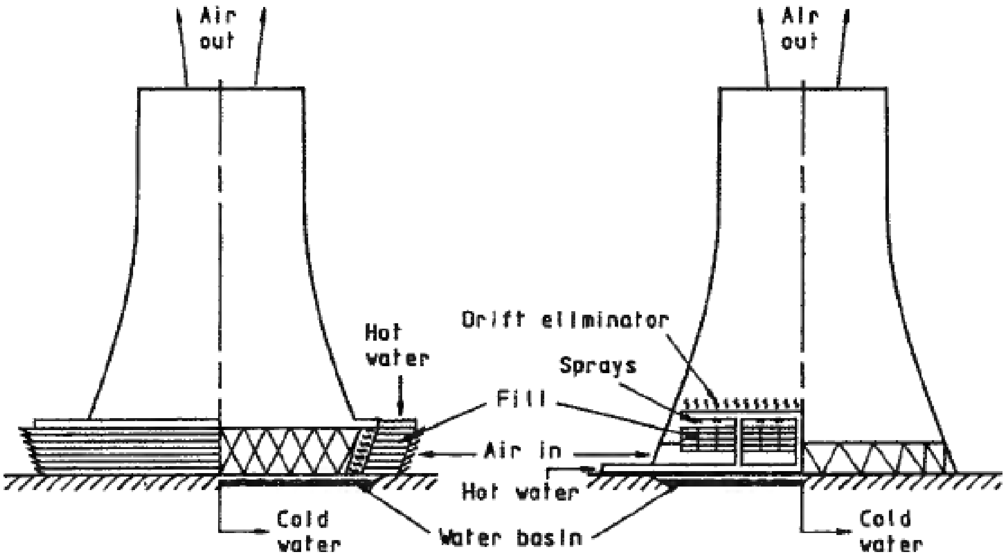


Figure CC-11. *Sample Wet Natural Draft Cooling Tower Schematics (Kroger, 2004)*

SONGS would require two wet natural draft cooling towers per unit, each approximately 400 feet in diameter and 600 feet high.

3.2.3.2 Wet Mechanical (Forced) Draft Cooling

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

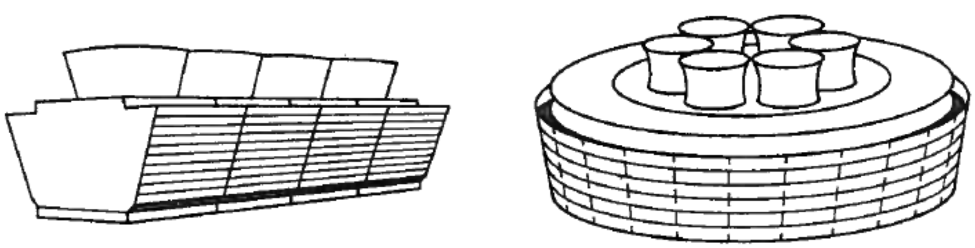


Figure CC-12. *Sample Wet Mechanical (Forced) Draft Cooling Configurations – Rectangular In-Line (Left) and Round(Right)(Kroger, 2004)*

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

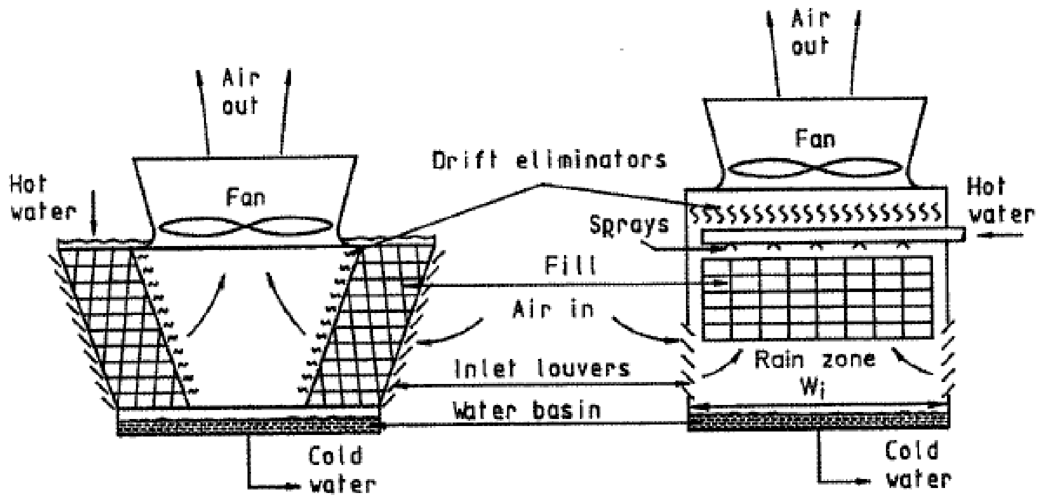


Figure CC-13. *Sample Wet Mechanical (Forced) Draft Cooling Tower Schematics (Cross- and Counterflow Internals Configurations) (Kroger, 2004)*

Two round wet mechanical (forced) draft cooling towers per unit, approximately 485 feet in diameter and 125 feet high, would be necessary to achieve the desired performance at SONGS. Approximately 32 fans would be needed per tower, with a total fan input power requirement of 19,200 hp (14.4 MW) per unit.

3.2.4 Hybrid Wet/Dry Cooling

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

SONGS, since they provide the benefit of efficient wet cooling without the visual impact of plume, and they are much lower in profile than natural draft towers.

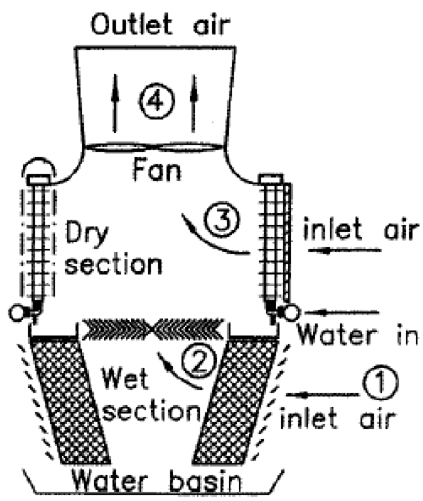


Figure CC-14. *Sample Hybrid Cooling Tower Schematic
(Kroger, 2004)*

Taking into consideration the thermal and realistic plume-free requirements at SONGS, a hybrid system would need to consist of two round forced-draft towers per unit. A schematic of this tower type is included below. Each tower has an overall diameter of approximately 485 feet and is 175 feet high. Over 60 fans per tower using a combination of 200 hp and 300 hp would be required to provide airflow over both the wet and dry sections. The total fan power requirement would reach approximately 32,000 hp (23.8 MW) per unit. When the plume abatement equipment is in operation, the evaporative rate of a hybrid tower is less than that of one operating wet tower. This is because the process used to reduce plume visibility results in some recondensation of the water droplets that had been evaporated into the exiting air stream. The makeup water requirement for the hybrid towers considered in this study is approximately 13,230 gpm per unit. This would need to be supplied by either a fresh or reclaimed water source. The existing once-through intake structure on the ocean would not be used to supply this makeup.

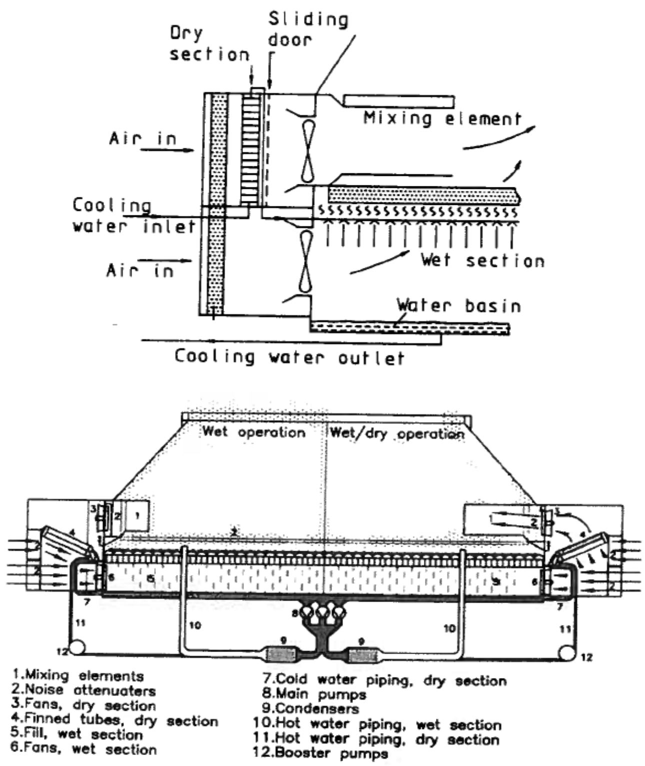


Figure CC-15. *Sample Round Configuration Hybrid Cooling Tower Schematic (Kroger, 2004)*

Table CC-1
Closed-Cycle Cooling Systems Technology Summary

Parameter	Passive Draft Dry Air Cooling	Mechanical (Forced) Draft Dry Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Total number of towers required for plant (both units)	6	2	4	4	4
Area required per tower, ft²	292,247	1,018,400	125,664	184,745	184,745
Total area required (for all towers for the plant, including required spacing in between), ft²	6.4 million	2.8 million	1.2 million	1.8 million	1.8 million
Overall tower height, ft	570	114	600	125	175
Makeup requirement per unit, gpm	Insignificant	Insignificant	14,700	14,700	13,230
Fan power requirement per unit, hp	0	43,700	0	19,200	32,000
Fan power requirement per unit, MW	0	32.6	0	14.4	23.8

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

3.3 Deepwater Offshore Intake

As described in Section 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 *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 with 70-foot depth combined with SONGS once-through cooling water flow rate is pushing the limit of the state of technology for hydraulic design of the associated large pump intake system, let alone extending the offshore intake any further to water depths such as 200 or 250 feet. Extending the offshore intake location to 200 or 250 feet water depth will be impractical and offers no clear benefits of entrainment reduction.

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 a new intake structure is a result of substantial increase in head loss that will require demolition of the 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 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, with security bars 6 inches apart, and designed with an inlet average flow velocity of 0.5 fps or lower to satisfy the *California Once-Through Cooling Policy* impingement reduction requirement. Considering the large amount of cooling water withdrawal requirements, the velocity cap 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 that 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 cap assemblies will probably not present an obstacle to surface navigation due to their deepwater location.

It should be noted that the deepwater intake technology described here only addresses the normal heat sink circulating water system. The existing offshore intake piping system will still function to convey cooling water flow from the velocity cap dedicated for the auxiliary offshore intake system, which is located approximately 92 feet shoreward from the existing circulating water velocity cap. Therefore, there will be no impact to the safety-related saltwater cooling pump operation and its dedicated water supply. Once the deepwater intake is in place, the existing circulating water velocity cap will be capped.

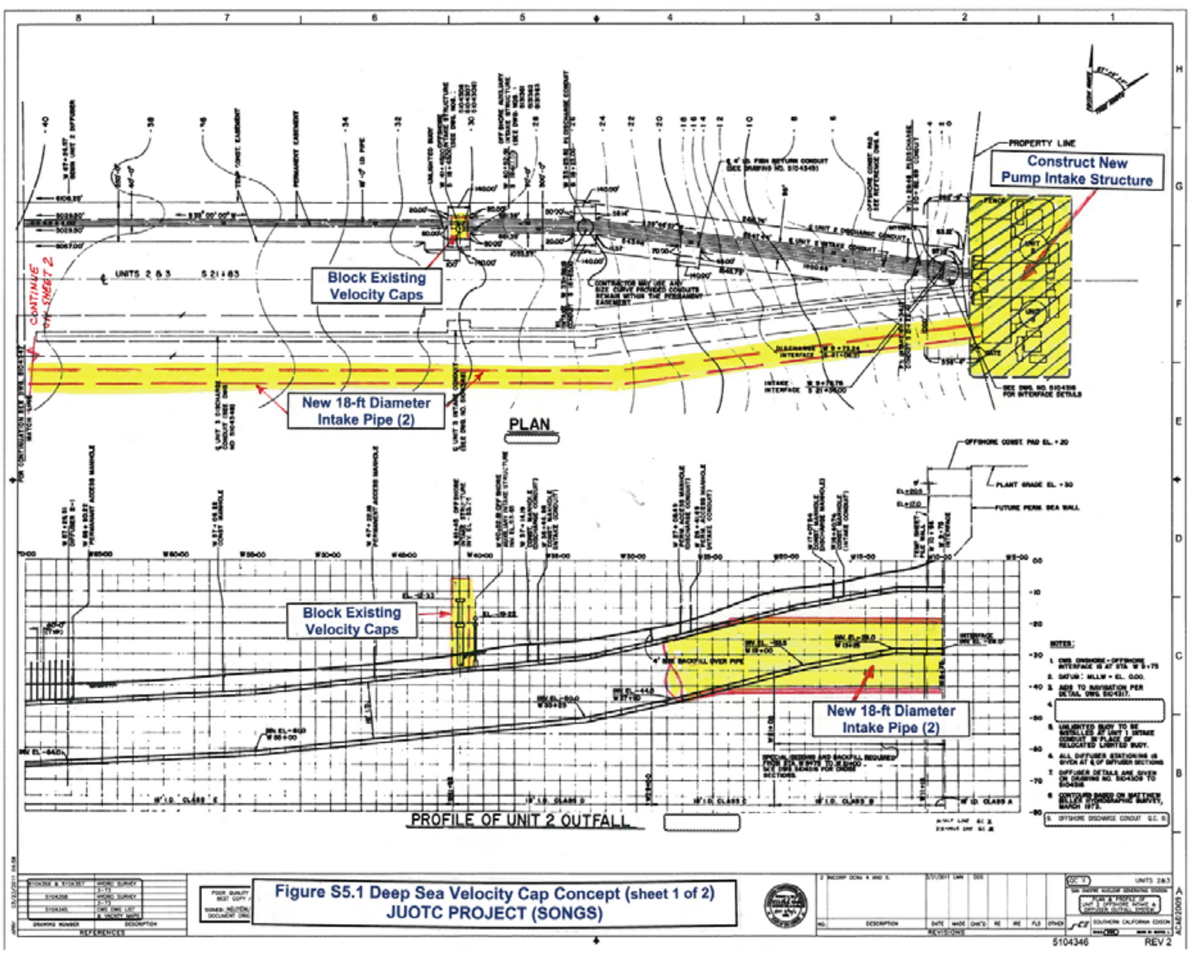


Figure DW-1. *Deep Sea Velocity Cap Concept (1 of 2)*

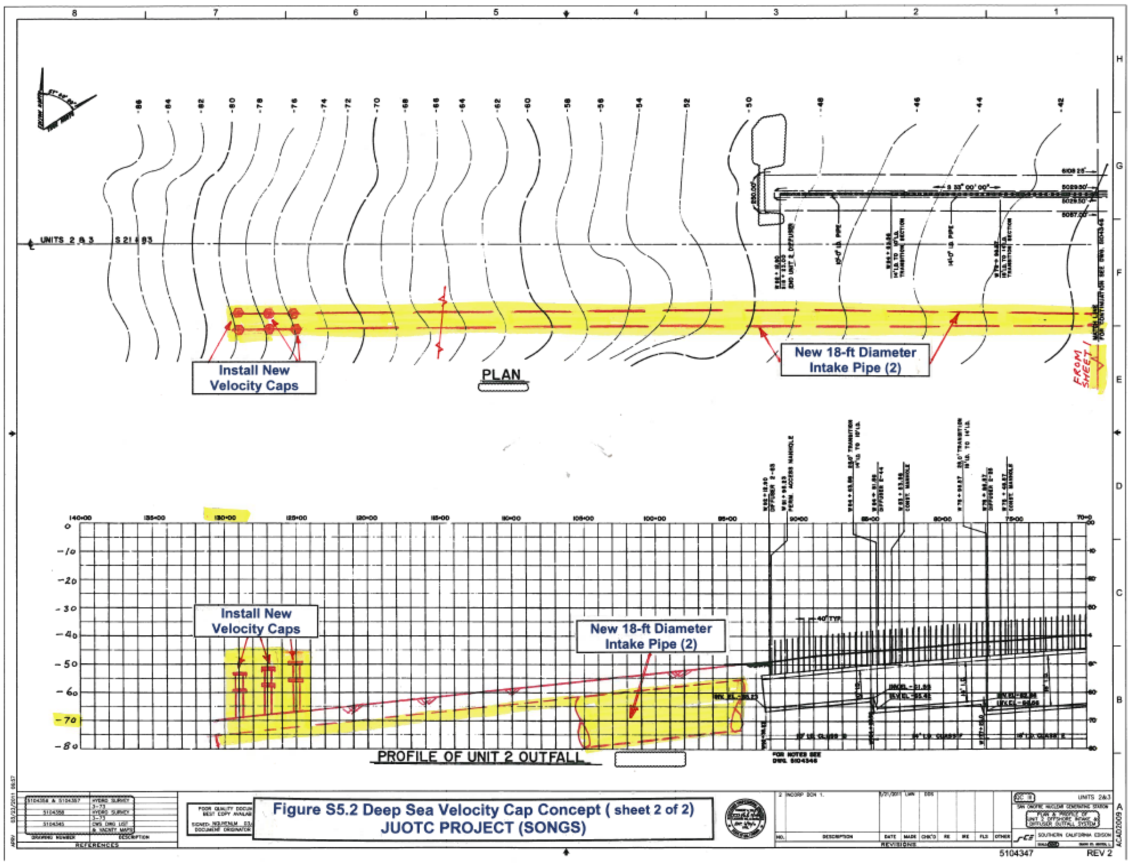


Figure DW-2. *Deep Sea Velocity Cap Concept (2 of 2)*

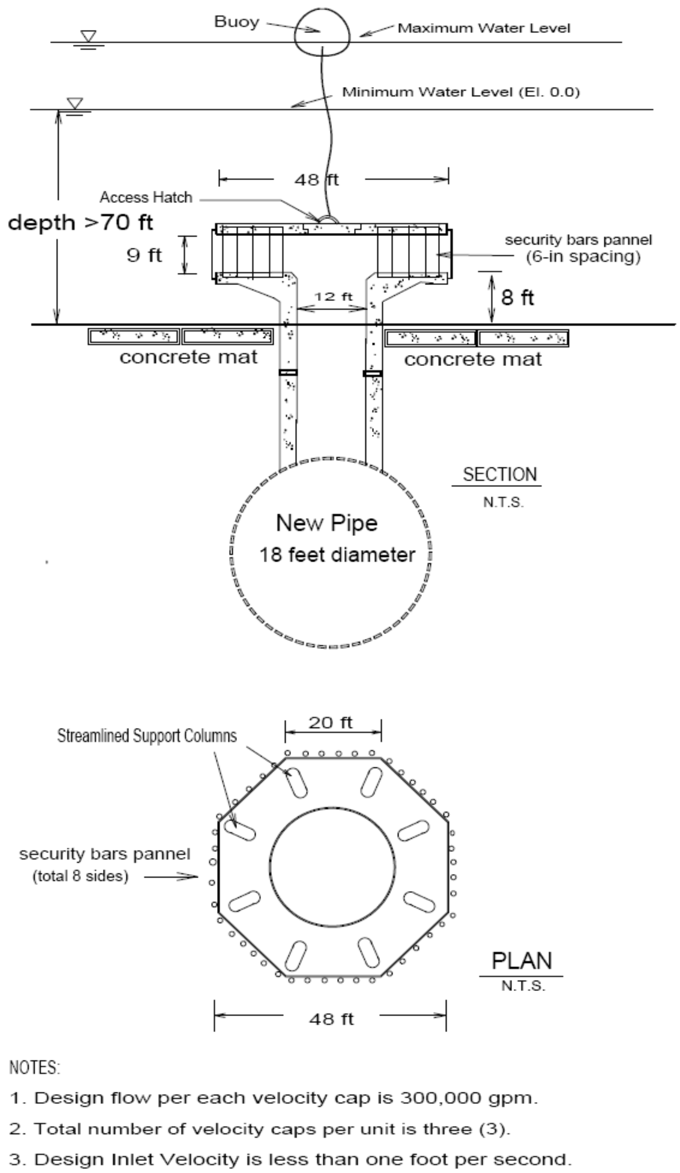


Figure DW-3. *Deep Sea Velocity Cap Intake Concept*

3.4 Initial Intake Relocation

Retrofitting the SONGS existing intake to incorporate a shoreline intake technology would require major structural modification and new construction. A shoreline intake technology will involve creating a shoreline basin enclosure to protect the intake structure from direct wave damage. This would necessitate dredging of the sea bottom inside the basin to a depth suitable to support the operation of the cooling water pumps. Considering the existing shallow seabed conditions at the SONGS shoreline and at the intake location, a minimum basin size would be on the order of approximately 2,000 feet long by 1,500 feet width (seaward) to a depth of greater than 10 feet below sea level. The basin needs to be formed by use of construction of offshore breakwaters (see Figure IR-1).

The basin's purpose is to encompass the intake, deflect the design waves, and provide the appropriate minimum seabed elevation. The interior of the basin is based on the depth required for operation of the cooling water pumps.

At SONGS, a shoreline intake will be inferior compared to the existing offshore velocity cap system because this shoreline system:

- Requires additional substantial seabed property for placement of breakwaters and construction of shoreline intake basin.
- Requires substantial dredging of the enclosed basin to provide minimal depth for pump operation (minimum 10 feet below sea minimum water level).
- Requires an open inlet to the sea, resulting in an open gateway for fish and other marine organisms without the positive benefit of the velocity cap.
- Requires substantial demolition and construction at the shoreline to fit the new system into the existing system.
- Requires a lengthy outage of both units to support initial construction of the system and later outages for maintenance dredging.

Due to the seabed being sedimentary at SONGS, it is anticipated the intake will be subject to regular dredging during the operation phase to maintain the required sea depth.

The new shoreline intake will need to take in all the plant cooling, both for the normal heat sink of the circulating water and for the safety-related saltwater cooling pumps.

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, some consideration is needed 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 area 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.

Figure IR-1. *Layout of Shoreline Intake Concept*

3.5 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

Inshore (onshore) fine mesh screens technology is intended to achieve significant improvement in impingement mortality and entrainment reduction by replacing the existing coarse screen panels (9.5 millimeters) with fine mesh panels. To reduce entrainment of fish eggs/larvae, it is expected that screen mesh needs to be in the range of no more than 1 to 2 millimeters effective opening. With this retrofit, all organisms and debris larger in size than 1 to 2 millimeters would be blocked by and impinged on screens and discharged as debris.

The only way to allow reasonable survival of the impinged eggs/larvae would be to introduce an individual fish collection and return system to each traveling screen. The existing louver and vanes are intended for juvenile and adult fish and not for the eggs/larvae. Collected larval organisms and fish would be sent back to the ocean using the existing fish return.

Adding an individual fish collection and return to each screen will involve adding a fish bucket at the bottom of each screen panel and introducing two pressure sprays. The low-pressure spray (approximately 10 psi) is designed to push impinged egg/larvae and fish off the screen face and into the return piping. The subsequent high-pressure spray removes the remaining debris from the screens. This operation will result in stress to the collected larval organisms and will impact the survival rate. However, these features will result in improvements over the existing condition, which entails 100 percent administrative loss of larval organisms due to entrainment through the existing screen system.

The very compact cooling water intake structure and the angled screen arrangement will not support the addition of screens or their conversion to another screen type offering greater surface area, unless a new screen house is built nearby. With the current screen arrangement, simply replacing the existing mesh with fine mesh panels will result a significant increase of debris volume on screen panels. It is doubtful the existing screens can accommodate the additional load imposed by this debris because of the very high through-screen velocity of 3 fps (roughly 1.5 to 2 fps approach velocity). There have been incidents at power plants in which reducing screen mesh from 6 millimeters square to 2 millimeters square (with approach velocities over 1 fps) resulted in the collapse of screen panels.

As a result, in lieu of retrofitting the existing screen system within the pump intake, it is necessary to add one new screen house per unit. This new screen house has to be built near the existing pump intake so that the offshore intake pipe flow can be diverted to the new screen house and the filtered flows then returned to the existing pump intake. A schematic view of the new screen house addition is shown in Figure IFMS-1. It should be noted that this technology evaluation focus is on the onshore pump house nearshore intake line only, and there is no change to the offshore intake system.

Existing 316(b) Demonstration Study on Using Fine Mesh Screens

In 2008, EPRI conducted studies on feasible entrainment reduction options available to SONGS (E, 2008). In the demonstration study, assessments were made on retrofitting the existing intake by modifying the screens to include fine screen panels with fish collection buckets, low-pressure screen spray wash, and continuous screen rotation. The fine mesh screens are often designed to meet a 0.5 fps approach velocity, but this would require adding a new screen house to the existing SONGS pump intake. The EPRI assessment concluded that the retention of dominant species in the area, such as anchovy and queenfish, was relatively high at 81.3 and 89.8 percent, respectively. However, survival was relatively low, resulting in an overall estimated efficiency of 9.9 and 16.7 percent for these two species. EPRI also noted potential issues with the need for continuous screen operation due to the higher loading, which may result in biofouling and mechanical problems for these screens. EPRI further concluded that adding a new screen house to provide space for more traveling water screens would result in plant downtime of at least 1 year. Due to the impacts to the shorelines and cost associated with replacement power, EPRI did not further evaluate the addition of a new screen house.

EPRI commented separately that SONGS is already in compliance with the impingement mortality reduction rule, since the offshore velocity cap intake is paired with the onshore fish return system (EPRI, 2008).

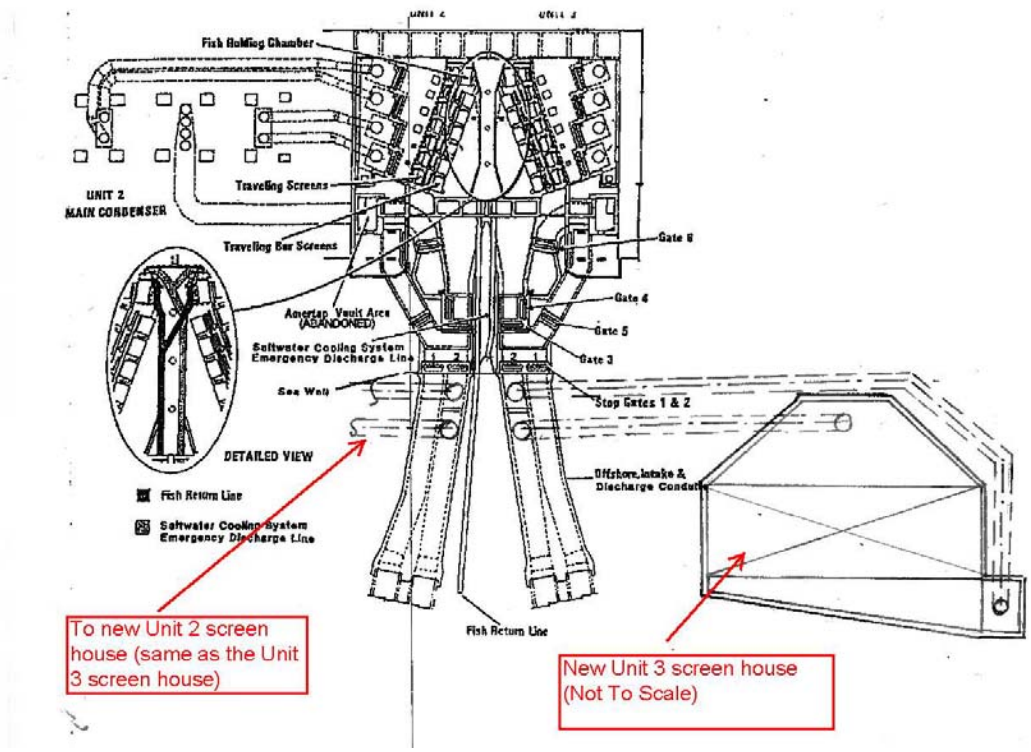


Figure IFMS-1. *Schematic View of New Screen House*

3.6 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

At SONGS, the current cooling water system for each unit consists of an 18-foot-diameter buried offshore pipeline system that withdraws seawater via a velocity cap intake located approximately 3200 feet offshore. The 18-foot pipe delivers water to onshore pump intake structure through gravity. While the velocity cap intake is a proven technology that can substantially reduce fish entrainment, the current velocity cap intake velocity of 1.8 fps is high for this type of offshore intake hydraulic design. The wedge wire technology is, however, designed to enhance this system's environmental effectiveness.

3.6.1 Design Features of Wedge Wire Screens

Wedge wire screens have the ability to effectively minimize the impingement mortality and reduce entrainment with the screens' inherent proper engineering design. The recommended slot through-flow velocity wedge wire screen system will not exceed 0.5 fps and therefore will meet the impingement reduction of *Cali-*

fornia Once-Through Cooling Policy. The general favorable design features of wedge wire screen technology, which mostly are absent at the existing velocity cap inlet system, include:

- Wedge wire screen provides passive screening with no moving parts, preventing injury to fish and fish larvae.
- Screen internal design provides a uniform flow velocity, along the entire screen surface, avoiding high inlet velocity zones.
- The wedge shape of wires results in inward decelerating flow velocity, avoiding suction of aquatic life.
- Screen through-flow velocity of 0.5 fps results in approach velocity adjacent to screen surface (say 6 inches away) of less than 0.3 fps. Sea current velocity is normally above this value, meaning that the sea current has more force to carry away the fish egg and larvae than the screen approach velocity.
- Screen design avoids formation of swirling flows around the screen, sparing aquatic life from the distress related to this phenomenon.
- Wedge wire screens are installed approximately 7 feet above the sea bottom, avoiding the impact to benthic life.
- The cylindrical screen shape assists the approximately lower 2/3 perimeter of the screen surface to stay clean for most types of foreign floating objects due to downward gravity force effect and slow inlet design flow velocity.
- The wedge wire screen blockage is a deterrent to juvenile fish and fish larvae. The screen blockage as an example for a 6-millimeter slot size screen is approximately 40 percent, and for a 2-millimeter slot size screen is approximately 70 percent.
- Relative to the existing intake system, the maximum size juvenile fish and fish larvae that can pass, as an example, through a 6-millimeter slot is less than 6 millimeters, meaning larger fish and larvae stay out at all times.
- For a specific water withdrawal requirement, the number of required wedge wire screens will change, depending on the desired slot size. As an example, approximately twice as many screens are required for 2-millimeter slot screens compared to a 6-millimeter slot size screens for the same flow rate.
- Screen installation in deeper seawater depths (approximately 30 to 40 feet) allows the screen to experience a substantially reduced wave action, resulting in nearly uniform sea current velocity field around the screen.
- Cylindrical *T*-shape wedge wire screens with end cones are installed parallel to the sea current, assisting in diversion of floating debris from the screen.
- Approximately 20 percent additional redundancy is required in the design (approximately four additional screens per unit for 6-millimeter slot size screens) to minimize operations and maintenance requirements.

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

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

3.6.2 Impingement and Entrainment at Wedge Wire Screens

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

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

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

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

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

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

Enercon conducted alternative intake technology evaluation for Indian Point 2 &3 (Enercon 2010) and concluded that use of the wedge wire screens can be effective in reducing entrainment loss up to 89.8 percent and impingement loss up to 99.9 percent from the regulatory baseline. It also concluded that use of both 2-millimeter slot and 9-millimeter slot would achieve substantial EA1 (Equivalent Age 1) impingement and entrainment reduction. EA1 is defined as the number of age 1 fish that eggs, larvae, and juveniles lost to entrainment would have been expected to produce had they not been entrained. Potential percent reduction of annual EA1 impingement and entrainment losses from the regulatory baseline due to use of wedge wire screens in each month with through-slot velocity of 0.5 fps are practically the same, ranging from 88.8 to 89.8 percent, for slot sizes of 1 millimeter, 1.5 millimeters, 2 millimeters, 3 millimeters, 6 millimeters, and 9 millimeters.

In addition, parallel orientation of cylindrical wedge wire screens with flow current and higher magnitude of the current velocity have considerable effect on reducing the entrainment. Alden Research Laboratory (Amaral, 2003) experiments demonstrated that the flow currents at or above screen through-velocity substantially reduce the entrainment: the higher the ratio of the sea current to screen velocity, the lower the entrainment.

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

3.6.3 Wedge Wire Screen Requirements

Retrofitting the SONGS existing intake to incorporate wedge wire screen technology will require major structural modification and new construction activity. This technology involves capping the existing offshore velocity cap intake head and attaching a new manifold with multiple arrays of wedge wire screen modules to the existing 18-foot-diameter pipe for each unit. The wedge wire screens will be located offshore and near the existing velocity cap location to maximize the water depth over the screens. The wedge wire screen manifold will be connected to the 18-foot pipe via a new 18-foot-diameter branching junction on the upstream side (seaward) of the safety-related saltwater intake.

The wedge wire screens will be circular cylinder shape, *T*-type, and each module will be 8 feet in diameter. This size is the largest available size that boasts some operating experience. Considering the large amount of cooling water withdrawal requirements, the screens will be high-capacity/high-performance type design based on a maximum slot flow-through velocity of 0.5 fps. Due to the existence of sea kelp and other sea life and potential loading, a preliminary slot size of 6 millimeters is selected. Smaller slot sizes such as 2 millimeters will be considered, but their use will increase the potential for clogging of the screens. An in situ screen testing program will be conducted as part of the detail design process for both 2-millimeter slot and 6-millimeter slot, to evaluate the entrainment and impingement reduction performance vs. debris clogging and biofouling potentials.

Eighteen screens are required for each unit for 6-millimeter slot size screens with no redundancy. The *T*-shape wedge wire screen design ensures uniform flow across the screen surface due to permanently placed internal flow modifiers. The screen material will be based on copper-nickel alloy to resist biofouling in the sea environment. Screen arrays will be arranged in the direction of the dominant sea current to effectively sweep the screen surfaces of potential trash. Figures WW-1 through WW-3 show the schematic arrangement for the proposed alternative.

3.6.4 Final Wedge Wire Technology Selection

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

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

- Historic operating plant data needs to be collected. Historic data to include operations and maintenance records, photos, reports, and fact sheets to understand 20-plus years of operating experience.

- Nearby plant experience with use of wedge wire screens will be collected and evaluated (if any).

- Aquatic field survey of sea bottom will be performed to identify a suitable location for placement of screens and to minimize biologically sensitive and production areas.

- If not available, a hydrographic survey of the sea will be performed for proper evaluation of local hydrodynamics of the source water to facilitate the effectiveness of reduction mechanisms afforded by the screens.

- In situ testing of two screen sizes (for example, 2 millimeter and 6 millimeter) at each site is necessary and essential to evaluate entrainment, impingement, and debris effect on the screen's performance.

- Material of construction and slot size will be field tested.

- Hydrodynamic, geological, geotechnical, constructability, and safety evaluation of the proposed system will be performed.

Upon complete evaluation of the due diligence survey, physical field testing, and engineering and constructability investigations, the suitable slot size and material can be determined along with their impact on the aquatic life. As noted earlier, when screen slot sizes decrease, the number of screens needed will increase greatly. As an example, approximately twice as many screens are required for 2-millimeter slot screens compared to 6-millimeter slot size screens for the same flow rate.

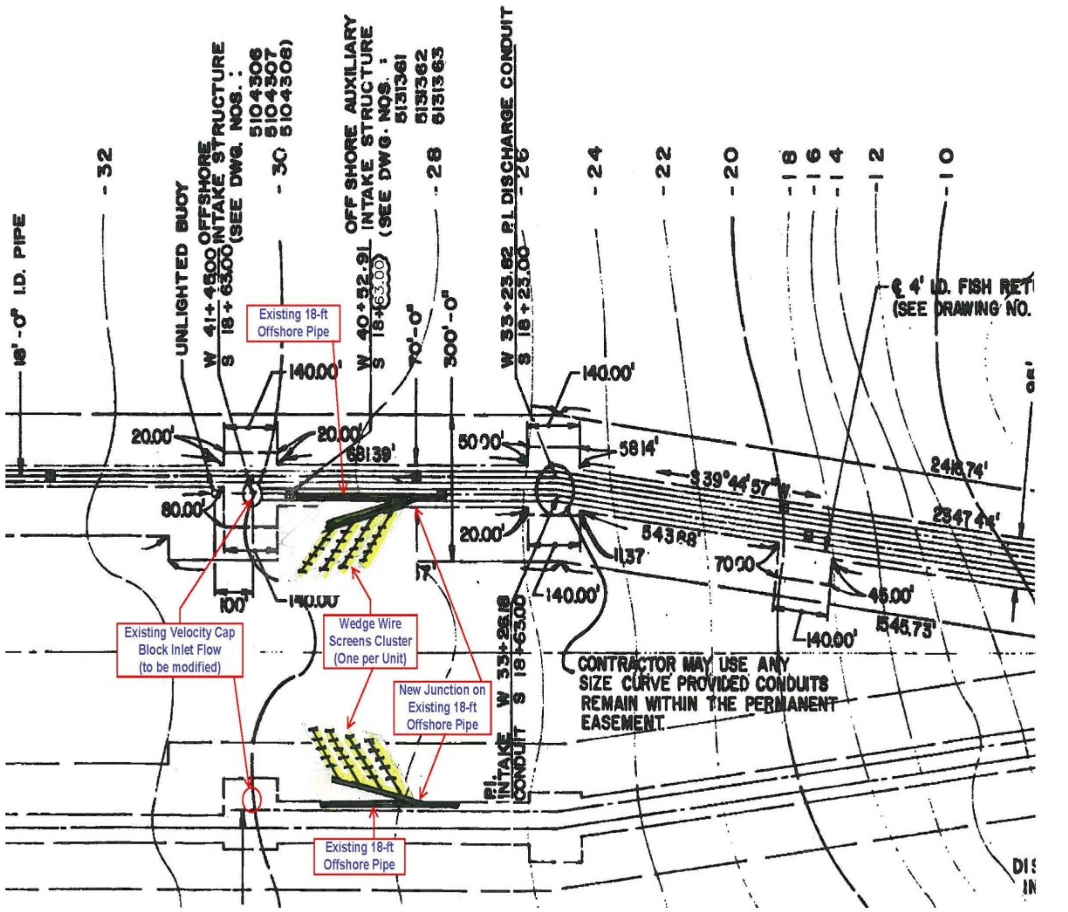


Figure WW-1. *Offshore Wedge Wire Screens Concept Layout*

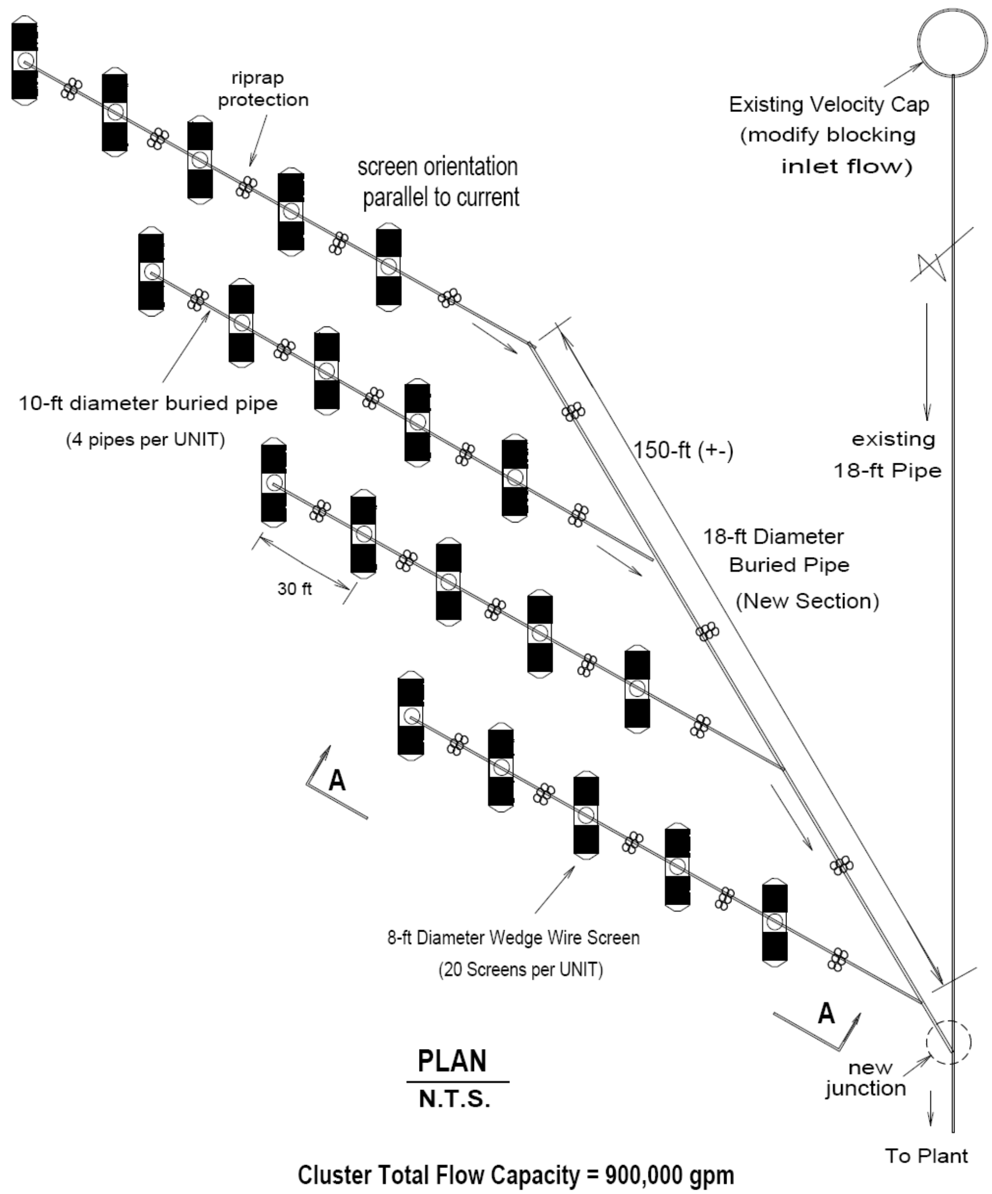


Figure WW-2. *Offshore Wedge Wire Screens Concept Layout*

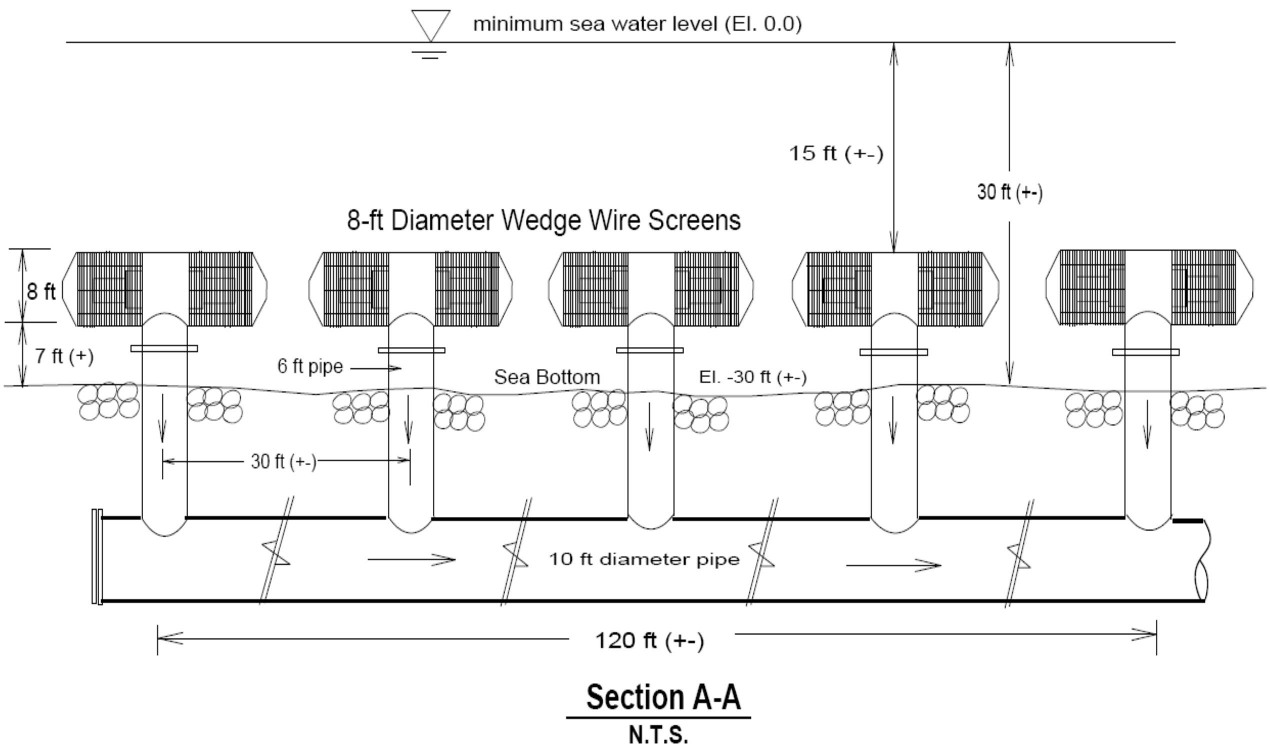


Figure WW-3. Sectional View of Wedge Wire Screen Intake Modular Assembly

3.7 Operational Strategies to Reduce Impingement and Entrainment

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

The operational strategies considered fall into three main categories:

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

3.7.1 Cooling Water Flow Rate Reduction

It is commonly accepted that the overall entrainment loss and, to a certain level, impingement mortality at an intake, are strongly related to the amount of water withdrawn from the source water. That is, a reduction in water withdrawal rates will likely improve the entrainment loss and associated impingement mortality proportionally. Operational conditions that could result in a reduction of cooling water flow demand are: (1) a reduction in plant load, (2) an increase in condenser temperature rise, and (3) selective flow reduction in response to temporal fluctuation of aquatic abundance in the source water (for example, during fish spawning seasons).

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

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

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

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

It is anticipated that the implementation of the flow reduction operational strategy will introduce marginal benefits with respect to entrainment and impingement reduction, as demonstrated in Section 4.2.7.

3.7.2 Continuous Operation of Fish-Handling System

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

3.7.3 Fish Deterrent Systems

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

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

- *Hanging Chain Curtain* A typical hanging chain curtain might consist of a row of chains placed across the intake channel (ASCE, 1982). It acts as a fish barrier but its practicality at the offshore velocity cap location is questionable.

- *Acoustic Fish Deterrents* There are two general types of acoustic fish deterrents: continuous wave and pulsed wave. Both of these deterrents use sound/pressure waves (noise) to influence the behavior. Acoustic fish deterrents are portable or can be mounted on stationary platforms.

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

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

3.8 Source Water Substrate Filtering/Collection Systems

The source water substrate filtering collection system, also known as an infiltration intake, is an unconventional intake design. This type of intake, to our knowledge, has not been applied to a once-through cooling system with a required design flow rate capacity of approximately 1.7 million gpm. It has been used, however, for cooling tower makeup water systems, with intake flow rates that are typically a fraction of the once-through cooling flow rates. This type of intake consists of a set of horizontal laterals constructed of perforated or slotted pipe placed below the seafloor in a bed of porous media. The laterals are connected via a network of manifolds leading to a pump intake forebay for use in the cooling water system.

The advantages of the substrate filtering collection system include:

- It can be applied to shallow water areas close to the shoreline.

- The flow capacity is relatively unaffected by tidal influences.
- The turbidity of the produced water is low and relatively constant.
- Impingement and entrainment of aquatic organisms and debris are eliminated.

However, the disadvantages are:

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

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

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

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

There is another type of source water collection system called vertical wells (either conventional wells or radial collector wells). However, the source water substrate filtering collection system is more efficient for production of large quantities of water as compared to onshore wells (either conventional vertical wells or radial collector wells). Conventional vertical wells are placed in vertically oriented boreholes and consist of a well screen and blank casing. In general, the maximum yield of a typical vertical well is approximately 6,000 gpm for a 3- inch diameter well (Sterrett, 2007), which is about the practical well size limit of conventional drilling equipment. For a 1.7 million gpm design capacity, approximately 280 vertical wells and associated pumping stations would be required if the maximum yield exists from each well. This maximum yield assumes that a highly permeable material, such as a gravel deposit, is present in the subsurface, which is not the case at SONGS; hence the total number of vertical wells needed to meet the design flow rate capacity would be significantly greater than 280. The vast network of pumping station delivering flows to a central collection point will not be practical onshore. Radial collector wells (also known by the proprietary name Ranney Wells) consist of a central caisson and associated pumping skid, with well screens extending laterally outward beneath the water source. Radial collector wells have been designed with capacities from 2 to 80 mgd (Riegert, 2006) or 1,400 to 56,000 gpm. Using this range of capacity, it would require between 30 to 1400 radial collector wells and associated pumping installations to meet the design flow rate capacity, assuming ideal subsurface conditions, for example, a gravel deposit. The subsurface conditions at SONGS suggest that high numbers of radial collector wells would be required.

Onshore vertical and radial collector wells have the following limitations:

- Greater horizontal spacing requirements to reduce interference effects between conventional wells or to allow lateral placement for radial collector wells.

- Greater vertical penetration to produce optimum flow to well.

- Well production rate limited to natural formation hydraulic conductivity.

- Geological conditions at SONGS indicate the presence of shallow sandstone bedrock that may be conducive to large flows but additional study is needed to confirm. Pumping information at the SONGS site is not available due to saltwater intrusion concerns.

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

It should be noted that the substrate filtering collection system is only for the normal heat sink circulating water system, replacing the existing primary offshore intake system. However, the existing intake pipeline and the auxiliary offshore intake system will remain intact without any change, providing 34,000 gpm design flow for safety-related saltwater cooling pumps. The existing velocity for primary offshore intake system will be capped.

3.8.1 Conceptual Design

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

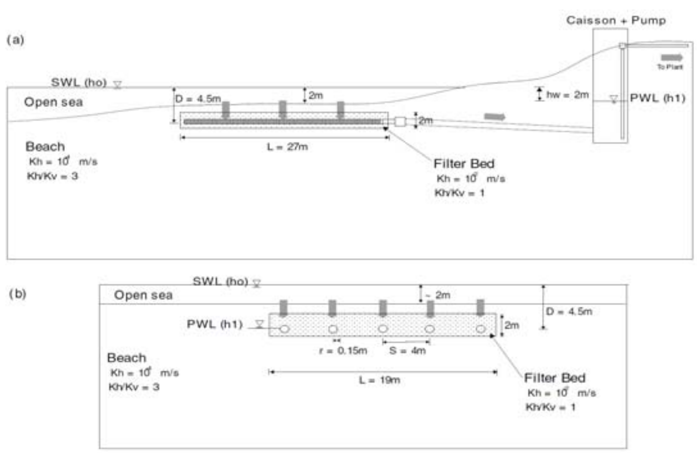


Figure SWS-1. *Conceptual Layout of a Typical Substrate Filtering Collection System (Taylor and Headland, 2005)*

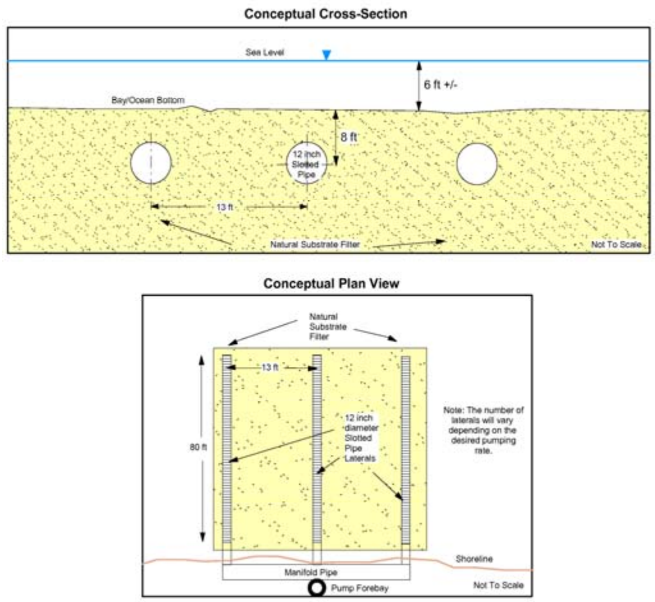


Figure SWS-2*. Natural Substrate (Beach) Filtering Collection System Conceptual Design*

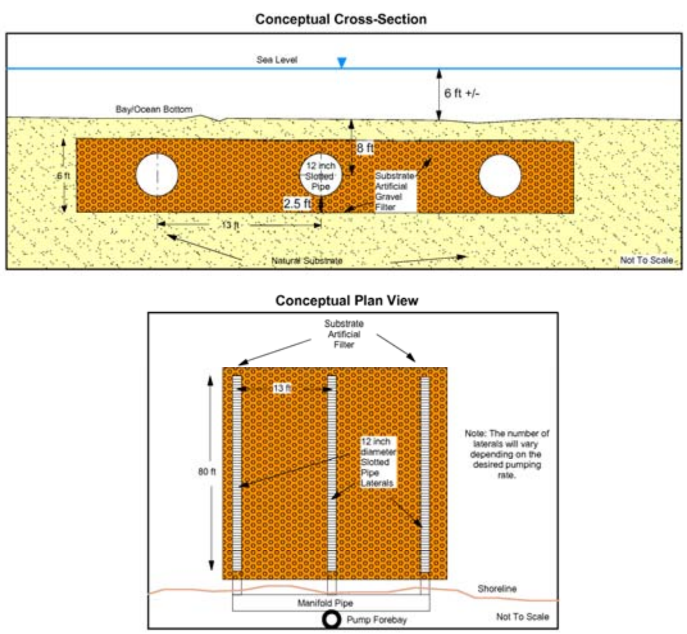
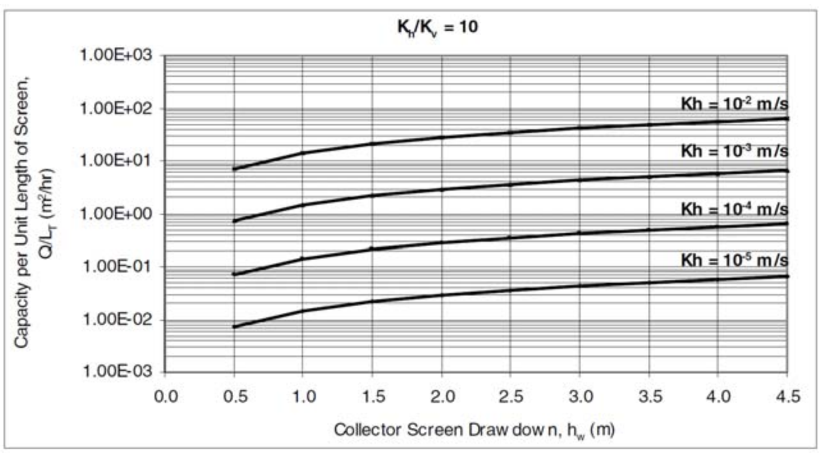


Figure SWS-3.
Artificial Substrate (Beach + Filter) Filtering Collection System Conceptual Design

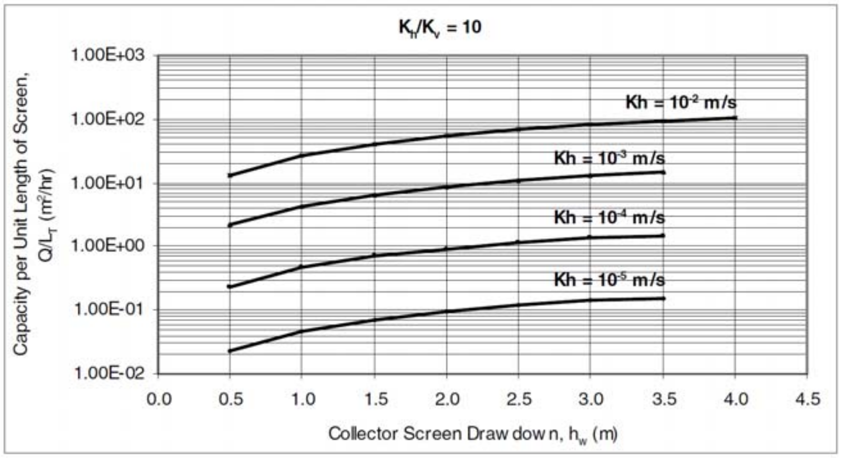
The natural filter system is used in area where the natural substrate (offshore deposits of sand and gravel) has the desired material properties (hydraulic conductivity) for the required flow velocities through the substrate. These properties serve to limit the need to increase the laterals area. The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

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



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

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



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

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

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

3.8.2 Design Considerations

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

- Site-specific hydraulic conductivity testing for the substrate needs to be required.
- Substrate is not suitable for shallow (less than 10 feet) bedrock areas due to excavation difficulty; however, there are other excavation technologies, such as horizontal drilling, which can support installation
- Additional permitting for spoils disposal associated with the artificial filter system will be required.
- Substrate installation may require custom marine excavating equipment depending on site conditions.
- The local availability of material for the artificial filter system needs to be considered.
- Substrate may require a long-term prevention and maintenance program to limit vegetation growing over the substrate filtering collection system that could lead to a reduction in the permeability of the sea floor material above the laterals area.
- Installation of suction piping network connecting various offshore horizontal laterals to the shoreline pump intake will be required. The high head differential across the system will likely require the addition of a new pump forebay connected to a suction pipeline so that the cooling water pumps can have sufficient submergence and NPSH for continuous reliable operation.

3.8.3 Conceptual Design Assumptions

The following assumptions are used in the SONGS conceptual design:

Parameter	English Units	Metric Units
Flow demand (Q_d)	1,694,000 gpm	384,700 m^3/hr
Horizontal hydraulic conductivity (K_h)	28 to 280 ft/d	1 x 10^{-4} to 1 x 10^{-3} m/s
Anisotropy ratio (K_h/K_v)	10	10
Lateral length (L)	80 ft	25 m
Lateral spacing (S)	13 ft	4 m
Lateral area (L×S)	1,040 ft^2	100 m^2
Head difference across system (h_w)	11.5 ft	3.5 m

gallons x 0.003785 = m^3; m x 3.28083 = ft;. m^2 x 10.7639 = ft^2

The range of horizontal hydraulic conductivities selected represents typical values for beach sands. Woodward-McNeill & Associates (1974) report a coefficient of permeability (horizontal hydraulic conductivity) for the SONGS site of 0.025 feet/min (1.3 x10^{-4} m/s). Using the charts on Figures SWS-4 and SWS-5, the resulting infiltration areas needed to produce the required flow is listed below:

Intake Type	Horizontal hydraulic conductivity of substrate K_h (m/s)	Flow per unit length of lateral Q/L_T (m^2/hr)	Total length of lateral $Q_d/(Q/L_T) = L_\Sigma$ (m)	Number of laterals needed - N $L_\Sigma/25$ (m)	Infiltration area N x 100 m^2 (m^2)	Infiltration area (acres)
Natural	1 x 10^{-4}	0.5	769,400	30,800	3,080,000	761
Natural	1 x 10^{-3}	5	76,940	3,080	308,000	76
Artificial*	1 x 10^{-4}	1.5	256,500	10,260	1,026,000	254
Artificial*	1 x 10^{-3}	15	25,650	1,026	102,600	25

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

To develop the type curves shown in Figure SWS-5, the horizontal hydraulic conductivity of the artificial filter bed surrounding the laterals (shown in Figure SWS-3) is kept at a constant value of 1 x 10^{-2} m/s with anisotropy of 1 (that is, horizontal and vertical hydraulic conductivity of the artificial filter bed to be equal). Whereas the natural substrate filter was varied to develop the type curves in Figure SWS-5, based on the preliminary sensitivity analyses using the type curves presented in Taylor and Headland (2005), the area required for the substrate filtration collection system would range from 25 acres (102,600 m^2) to 761 acres (3,080,000 m^2), depending on the actual substrate horizontal hydraulic conductivity and whether the artificial or natural filtration system is used. This, however, is based on a 100 percent efficiency assumption.

Figure SWS-6 presents a conceptual location of the area where the substrate filtration collection system may be located. The locations are preliminary and the layout of the laterals has not been specifically delineated. The final locations and geometry of the actual size can be determined after the required site-specific tests and studies (geologic, hydrogeologic, geophysical, and thermal recirculation potential from the outfall diffusers) are performed. Figure SWS-6 shows the upper bound of the area required for lateral placement when using natural substrate material (775 acres). These areas are based on the assumptions that the substrate laterals are 100 percent efficient and that the differential head and other design parameters remain constant. However, the efficiency of the laterals will be less (due to operational plugging of the laterals over time), resulting in the need for a greater number of laterals and the associated increase in offshore impacts. If it is assumed that the laterals are 50 percent efficient over the operational life of the plant, then the size of the area and the laterals will be two times greater than initial estimate presented. The initial estimate is also based on the assumption that the flow across the laterals is uniform and the head in the laterals does not vary along the length; however, the flows and heads across the laterals could be nonuniform, resulting in dynamic head differential while pumping from a caisson and thus requiring additional laterals to account for a reduction in efficiency. In addition, flow balancing to each horizontal lateral will be difficult due to a large network of manifolds fanning out to receive flow from laterals and then converging to a central pump forebay. This condition will result in laterals located far away from the main manifold/piping that receive less flow than laterals closer to the main manifold/piping, which can ultimately cause flow stoppage through those laterals, reducing overall efficiency of the substrate intake system.

The composition and properties of the seafloor sediments at SONGS within 2 miles of the shore can be characterized as 3 to 8 feet of gravel, cobbles, and a trace of bottom sediment overlying the San Mateo Formation (Woodward-McNeill & Associates, 1974). The potential for submarine landslides and vegetation growth needs to be further investigated to determine the feasibility of implementing this technology at SONGS.

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

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

3.9 Variable Speed Cooling Water Pumping Systems

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

Currently, both SONGS Units 2 and 3 are baseload units and do not vary load on a daily basis. To determine the ability of variable speed pump technology to reduce impingement mortality and entrainment loss, in compliance with the *California Once-Through Cooling Policy* requirements, the range of flow reduction that can be achieved by most current large-capacity variable speed pumps is on the order of 15 to 30 percent.

According to published studies on the subject, it is generally established that a proportional relationship between reduction of flow and reduction of entrainment exists for a specific withdrawal location; that is, the percent of flow reduction approximates the percent of entrainment reduction. The potential of intake flow reduction with the use of variable speed cooling water pumps at SONGS will therefore imply a similar improvement on entrainment loss. As described in Section 4.2.8, the percent of condenser flow reduction (about the same as the percent intake flow reduction) equals approximately the percent of plant unit de-rating, with the condenser temperature rise remaining constant. The correlation on impingement mortality is not as well defined as impingement reduction, which can be a result of reduced amount of organisms potentially coming into contact with the components (such as the screens) of the intake structure or the lower impingement velocity associated with a reduced withdrawal rate. For this evaluation, a proportional reduction between percentage of impingement mortality and percentage of flow reduction is assumed.

Implementation of this technology would not involve any change to the safety-related saltwater cooling pumps, and there would be no impact on the safe operation of the intake.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 Closed-Cycle Cooling Systems

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

This initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable) for each tower system based on saltwater, freshwater, and reclaimed water use.

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

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

Permits and approvals, which 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.

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
- U.S. Marine Corps (USMC) – Camp Pendleton

- California Public Utilities Commission (CPUC)
- California Coastal Commission (CCC)
- California State Lands Commission
- State Water Resources Control Board
- 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 each closed-cycle system type and the three different water supply options. The results are summarized in Tables CC-2 through CC-11 (one for each water supply option) that list the applicable permits and approvals, determine the critical path review processes, and, most importantly, highlight those processes that may be fatally flawed or infeasible.

4.1.1.1 Dry Air Cooling – Passive Draft Dry Air Cooling and Mechanical (Forced) Draft Dry Air Cooling

The passive draft dry air cooling option will involve the installation of multiple tall towers in the Mesa Complex. The mechanical (forced) draft dry air cooling option will involve installation of two large rectangular (1340 feet by 760 feet each) towers also in the Mesa Complex. Neither the natural draft nor the mechanical draft towers will produce a visible plume. Water sources for both dry tower options can include saltwater, fresh water, and reclaimed water. The water withdrawal intake system for the saltwater option will require some limited marine work on the existing once-through cooling system's intake system. Fresh or reclaimed water can come from sources such as the Aliso Creek Ocean Outfall, the La Salina wastewater treatment plant in Oceanside, the San Clemente Water Reclamation Facility, and the Southern Orange County San Juan Ocean Outfall. These sources will supply the site via new pipelines. Shortfall in supplies will be covered by new desalination facilities. This is described in more detail in Section 4.5.1. The specific permits associated with external sources of freshwater and reclaimed water are beyond the scope at this initial assessment, but may be the subject of subsequent evaluations. The selection of the most favorable source or combination of sources to supply the required makeup water will be performed in Phase 2.

<u>U.S. Army Corps of Engineers</u>

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 water-borne navigation. While the passive draft dry air cooling and mechanical (forced) draft dry air cooling systems are expected to pose limited construction impacts to USACE jurisdictional waters, these options could potentially involve USACE permitting – at least for the saltwater source option. The freshwater and reclaimed water supply options will likely not involve work in jurisdictional waters unless the associated pipelines cross such areas. The impacts of those offsite impacts are not addressed in this evaluation.

For minor impacts, the USACE has established a general permit program (nationwide permit) for a host of less significant work processes involving waters of the United States. So it is possible that these saltwater tower options will demand a Nationwide Permit. If the marine work associated with these cooling tower options exceeds that threshold allowed by the nationwide permit or is otherwise deemed significant, SONGS would then be faced with securing a new individual Section 404/10 permit, but we believe this to be unlikely in this case. In addition to this federal permit, there is a somewhat parallel state regulatory review process, which culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the California SWRCB. The certificate is issued before the Section 404 permit is issued by the USACE. While individual Section 404 permit review periods can often be lengthy, the USACE representative for the SONGS area explained that all USACE facilities have the goal of issuing an individual Section 404 permit within 120 days of deeming the associated application complete (Lambert, 2012). This period is a goal, not a statutory commitment. Consequently, in many cases this goal is not realized. These delays are often associated with the mandated consulting processes that need to be pursued with the State Historic Preservation Office, U.S. Fish and Wildlife Service, or National Marine Fisheries Service. In other cases, there are extensions of public notice periods or scheduling complications for the public hearing. The applicant for the Section 404/10 permit has to directly pursue consultations with the CCC and SWRCB. Receipt of an individual Section 404 permit is contingent on previous receipt of permits from the CCC and SWRCB.

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

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

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

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 either the passive draft dry air cooling and mechanical (forced) draft dry air cooling towers, are subject to a formal review and approval process by the USMC and U.S. Department of the Navy.

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

The USMC representative (Rannals, 2012) explained that any new facility over 50 feet (above ground level) on the SONGS property could affect USMC training operations (for example, low altitude helicopter operations). The tall (570 feet) passive draft dry air cooling towers and the lower mechanical draft (forced) dry tower will likely present an impact to training operations (for example, low-altitude helicopter operations near the Mesa Complex). Both tower options will present an aesthetic impact to the "family housing section" located north of the SONGS property. There will be no visible plume or salt emissions from these dry systems. The USMC may also be interested in any cooling-system-related impacts to the SONGS Unit 1 outfall area, as it is considering the Unit 1 intake tunnel for a water treatment brine discharge path.

The review and approval process for new cooling system facilities at SONGS will be a several-month process (as much as 6 months). The application submitted to the USMC/Camp Pendleton (with appropriate site plan drawings and associated written descriptions) would initially be reviewed by the Camp Pendleton staff. This staff would 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 the 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.

The USMC will look very closely at any modifications at the SONGS facility that would jeopardize its primary training objectives (low altitude helicopter operations). As the tall passive draft dry air cooling and mechanical (forced) draft dry air cooling towers may impact this training, this cooling option (for any water supply option) can be characterized as an issue in regard to securing the necessary U.S. Department of the Navy lease.

California Public Utilities Commission

SONGS is regulated by the CPUC, which is charged with overseeing investor-owned public utilities. Given the lack of significant county involvement on this federal property, it may initially appear that the CPUC has the potential to be the designated Lead Agency for the CEQA review process. The CPUC was the Lead Agency for the CEQA review process for the recent SONGS Steam Generator Replacement Project. However, more recent information from SCE indicates that the cooling technology project will be considered a funding request, which would preclude the CPUC from being the CEQA Lead Agency.

CEQA is a regulatory statute that requires state or local regulatory agencies to identify, assess, avoid, or otherwise mitigate the significant environmental impacts from the proposed action—the addition of new cooling system technology. Another regulatory agency will have to be named the CEQA Lead Agency, since the proposed new passive draft dry air cooling or mechanical (forced) draft dry air cooling tower system will certainly trigger preparation of an Environmental Impact Report, which along with other financial information, would ultimately support the process to determine if SCE can recover the costs associated with this cooling system technology. This Environmental Impact Report is also used by other state agencies to support their respective review and approval processes.

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

While the review process and decision regarding cost recovery will likely be a lengthy, complex, and challenging process, no clear environmental barriers preclude completion of the CEQA review for the passive draft dry air cooling or mechanical (forced) draft dry air cooling technology option (for any water supply option). This statement does not imply that these closed-cycle cooling options are free of potentially complex and costly construction and operational demands.

<u>California Coastal Commission</u>

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

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

The only serious issue may be related to the tall passive draft dry air cooling structures and, to a lesser extent, the mechanical (forced) draft dry air cooling structures, which will be situated on the Mesa Complex. The CCC freely admitted that it would be very concerned with visual impacts from large cooling tower structures and towering plume columns. While this technology will not produce a visible plume, the tower size and location in somewhat elevated Mesa Complex could be an impediment to securing the Commission's Coastal Development Permit. The lower profile mechanical (forced) draft dry air cooling towers would not present this visual fatal flaw, but its expansive horizontal dimensions could prove troubling.

The passive or mechanical draft dry air cooling or mechanical (forced) draft dry air cooling towers would not involve significant offshore construction efforts, so the CCC concerns regarding the deleterious impacts on marine resources (for example, hard marine substrate, commercial fishing) would not prove to be a decisive or contentious part of its review process.

The CCC would obviously view the reduction of thermal impact from the cooling system discharge (no cooling tower blowdown discharge volume) and reduced entrainment/impingement impacts (reduced water withdrawal rates) as wholly positive outcomes from the application of a passive draft dry air cooling or mechanical (forced) draft dry air cooling system. The overall weight of these positives in CCC's balancing of environmental impacts is somewhat reduced by the fact that Commission is not primarily charged with evaluating the cooling system's compliance with the *California Once-Through-Cooling Policy* criteria or NPDES thermal discharge considerations.

The CCC review and approval process will be parallel with and influenced by the CEQA review process. That is, any application for a coastal development permit will be dependent on information that is generated by the associated Environmental Impact Report development process. Consequently, the CCC permit review process will also be coincident with CEQA and, consequently, its duration will mirror the CEQA timeline (6 months to 1 year). That period offers evidence that the coastal development permit could be a critical path permitting process for the passive draft dry air cooling or mechanical (forced) draft dry air cooling tower system (all water supply options).

California State Lands Commission

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

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

The passive draft dry air cooling and mechanical (forced) draft dry air cooling technologies could potentially require revisions of the current cooling system infrastructure in subaqueous lands. Commission representatives (DeLeon & Oggins, 2012) explained that recent experience regarding the progress of the lease approval process for nonnuclear facilities with existing once-through systems has been slow. Most of these facilities have requested extensions to continue to evaluate available mitigation strategies.

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. The passive draft dry air cooling or mechanical (forced) draft dry air cooling system-related limited marine work may allow one to follow the more expeditious Mitigated Negative Declaration path, avoiding the longer, more complex Environmental Impact Report/CEQA review path. Consequently, the State Lands Commission lease will probably not represent a significant permitting hurdle for these dry system cooling technologies (for any water supply option).

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

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

The passive draft dry air cooling or mechanical (forced) draft dry air cooling towers system will require the current SONGS NPDES permit to be revised to address the expected changes to the cooling system discharge. For a saltwater supply, this revision will reflect the expected increase in water treatment additives to the circulating water system, the significantly reduced saltwater withdrawal rates, altered storm water management features, and the elimination of continuous discharge. The *California Once-Through-Cooling Policy* requirements are inapplicable if the towers are supplied from freshwater and reclaimed water sources.

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

Both the SWRCB and SDRWQCB representatives (Morris, 2012 and Jauregui, 2012) explained that there are no obvious regulatory barriers regarding issuance of a revised NPDES permit for any of the cooling system options currently under consideration, including the saltwater passive draft dry air cooling or mechanical (forced) draft dry air cooling tower system. The SDRWQCB and SWRCB will not necessarily preclude any cooling system options from consideration, even if these options fall short of full compliance with the performance criteria tied to *California Once-Through-Cooling Policy* requirements (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent to those associated with a closed-cycle cooling system). The saltwater passive draft dry air cooling or mechanical (forced) draft dry air cooling towers can obviously demonstrate compliance with the *California Once-Through-Cooling Policy*. The fresh or reclaimed water-supplied tower system completely avoids these compliance issues.

The SDRWQCB is ultimately a political body whose members are interested in reviewing information/evidence from the applicant and from their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process to the passive draft dry air cooling or mechanical (forced) draft dry air cooling technology (for any water supply option).

San Diego Air Pollution Control District

SONGS is located within the San Diego APCD, a state-designated nonattainment 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 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 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 passive draft dry air cooling or mechanical (forced) draft dry air cooling system—systems that are 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 of (for example, 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 lead regulatory programs at this facility (Maschue, 2012). County Environmental Health Department has received CalEPA approval to be the Certified Unified Program Agency responsible for management of the following programs:

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

While the relevance of the various cooling system options to these six regulatory programs may not be immediately apparent, the passive draft dry air cooling or mechanical (forced) draft dry air cooling towers will require additional chemical additives, generate new waste streams, and potentially force the relocation of existing chemical and fuel storage systems. While these changes may result in a fairly involved revision process for many of associated management plans, this work does not appear to present any obvious county-sponsored regulatory barriers to the passive draft dry air cooling and mechanical (forced) draft dry air cooling system (for any water supply option) or represent critical path permitting processes.

Other Agencies

In addition to the key regulatory agencies described above, there are a number of regulatory agencies that could potentially play a role in the permitting of the passive draft dry air cooling or mechanical (forced) draft dry air cooling options. The construction of a passive draft dry air cooling and mechanical (forced) draft dry air cooling tower system will demand the addition of circulating water pipes, which will circulate water between the condensers in the power block area (SONGS Coastal Complex) and the cooling towers located in the Mesa Complex. Consequently, these pipelines will traverse the intervening Interstate-5 Highway, the North Coast Transit District Railway (used by Burlington Northern Santa Fe), and U.S. Highway 101. While the tunnel boring methods can be used such that construction will be able to progress with no traffic or rail disruptions, there will be a follow-on engineering investigation and permitting activity. Based on previous studies (Enercon), it is likely this effort will demand a full engineering and geotechnical survey that will subsequently support the process to secure multiple right-of-way encroachment permits from Caltrans. The overall design and installation of these saltwater circulating water lines will be subject to considerable review to confirm compliance with each organization's guidelines, codes, and criteria. Given the offsite source of reclaimed and freshwater supplies to these cooling tower systems, the required pipelines may require similar tunneling efforts.

The tall passive draft dry air cooling towers and, to a lesser extent, the mechanical (forced) draft dry air cooling towers, will significantly alter the overall profile of the SONGS facility and passive draft dry air towers are likely to require cranes over 200 feet above local ground level. As the towers and related cranes have the potential to be obstructions to aviation, related Notices of Proposed Construction or Alteration will need to be filed with the FAA to facilitate their review. The relatively low profile mechanical (forced) draft dry air cooling towers are large structures, but they will not alter the overall profile of the Mesa Complex as significantly. These towers and any related construction equipment are below the FAA 200-foot threshold and so the mechanical (forced) draft dry air cooling towers will likely not warrant the submittal of related Notices of Proposed Construction or Alteration with the FAA.

The U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. The passive draft dry air cooling or mechanical (forced) draft dry air cooling tower systems will likely be situated where the uplands and subaqueous lands has been previously disturbed, which would essentially preclude new impacts to previously undiscovered sensitive biological or cultural resources. Finally, the California Energy Commission, which has review responsibilities for new thermal facilities greater than 50 MW or for power increases of 50 MW or more, will be largely excluded from the permitting processes primarily because these dry cooling tower systems will not boost current power levels of the SONGS facility, let alone reach the necessary 50 MW threshold increase in power that could mandate California Energy Commission review.

<u>Summary</u>

The external approval and permitting assessment for the passive draft dry air cooling or mechanical (forced) draft dry air cooling systems identified a list of potentially applicable federal, state, and local permits and approvals. These permit lists are shown in Tables CC-2 through CC-5. The air-cooled process effectively mitigates all of the serious air quality concerns of the equivalent wet saltwater tower systems, while maintaining an intake system that is fully aligned with the requirements of the *California Once-Through Cooling Policy*. The main permitting challenges in this case are associated with the use of the entire Mesa Complex for industrial purposes. The CCC and CEQA review process and the associated permitting process may be contentious and lengthy. However, these permit processes are not expected to represent fatal flaws, which would preclude the passive draft dry air cooling or mechanical (forced) draft dry air cooling from further consideration.

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

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

The wet natural draft cooling tower cooling system option will demand the installation of multiple tall hyperbolic structures (approximately 600 feet above ground level) in the SONGS Mesa Complex area. The wet mechanical draft cooling system option will involve the installation of multiple wet mechanical draft cooling towers approximately 125 feet tall in this same location. The wet natural draft cooling and wet mechanical (forced) draft cooling tower plumes will be unabated and produce significant visible plumes.

The hybrid wet/dry tower cooling system option will involve the installation of multiple hybrid wet/dry round towers (approximately 175 feet high) also in the SONGS Mesa Complex. These towers, however, will be plume abated, which should limit the incidence of visible plumes.

Water sources for all of the wet tower system options can include saltwater (would need to be desalinated due to PM-10), freshwater, and reclaimed water. Fresh or reclaimed water can come from sources such as the Aliso Creek Ocean Outfall, the La Salina wastewater treatment plant in Oceanside, the San Clemente Water Reclamation Facility, and the Southern Orange County San Juan Ocean Outfall. These sources will supply the site via new pipelines. Shortfall in supplies will be covered by new desalination facilities. This is described in more detail in Section 4.5.1. The specific permits associated with external sources of fresh water and reclaimed water are beyond the scope at this initial assessment, but may be the subject of subsequent evaluations. The selection of the most favorable source or combination of sources to supply the required makeup water will be performed in Phase 2.

<u>U.S. Army Corps of Engineers</u>

The USACE is the lead agency for Clean Water Act Section 404 and Section 10 permitting processes, which are focused primarily on impacts to waters of the United States and waterborne navigation. While the wet cooling tower systems are expected to pose limited construction impacts to USACE jurisdictional waters, these cooling tower options could involve USACE permitting—at least for the saltwater source option. The freshwater and reclaimed water supply options will likely not involve work in jurisdictional waters, unless the associated pipelines cross such areas. The impacts of those offsite impacts are not addressed in this evaluation.

For minor impacts, the USACE has established a general permit program (nationwide permit) for a host of less significant work processes involving waters of the United States. Therefore, it is possible that the wet natural draft cooling tower saltwater option will demand a Nationwide Permit. If the marine work associated with this cooling tower option exceeds that threshold allowed by the Nationwide Permit or is otherwise deemed significant, SONGS would then be faced with securing a new individual Section 404/10 permit. In addition to this federal permit, there is a somewhat parallel state regulatory review process that culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the California SWRCB. The certificate is issued before the Section 404 permit is issued by the USACE.

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

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

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

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

USMC – 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 the wet cooling tower systems, are subject to a formal review and approval process by the USMC and U.S. Department of the Navy.

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

The USMC representative (Rannals, 2012) explained that any new facility over 50 feet (above ground level) on the SONGS property could USMC's their training operations (for example, low-altitude helicopter operations). Visible cooling tower plumes, such as from a tall wet natural draft cooling and lower profile wet mechanical (forced) draft cooling tower systems, would present a significant impact to training operations (for example, low-altitude helicopter operations near the Mesa area of the SONGS property). The plume-abated hybrid system would obviously not generate this plume. All of the towers will result in aesthetic and salt deposition impacts to the "family housing section" located to the north of the SONGS property. Obviously, the saltwater option will generate more significant salt deposition than the fresh or reclaimed water options. The USMC may also be interested in any cooling system-related impacts to the SONGS Unit 1 outfall area, as they are considering the Unit 1 intake tunnel for a water treatment brine discharge path.

The review and approval process for new cooling system facilities at SONGS is a several-month process (as much as 6 months). The application submitted to the USMC/Camp Pendleton (with appropriate site plan drawings and associated written descriptions) would initially be reviewed by the Camp Pendleton staff. This staff would 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 the 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.

It is fairly clear that the USMC looks very closely at any modifications at the SONGS facility that would jeopardize its primary training objectives, which include low-altitude helicopter operations in the SONGS Mesa area. Hence, the wet closed cooling systems options that are tall and/or that will generate visible plumes will be closely scrutinized. Ultimately, the wet natural draft cooling and wet mechanical (forced) draft cooling tower options may not receive final USMC/U.S. Department of the Navy approval of an amended lease. The hybrid tower system's lower profile plume and abatement feature may be key considerations in the final USMC/U.S. Department of the Navy lease review process. Thus, the wet natural draft cooling and wet mechanical (forced) draft cooling tower technologies (for any water supply option) present issues in regard to securing the necessary U.S. Department of the Navy lease. The hybrid system has much better chance of securing this lease.

California Public Utilities Commission

SONGS is regulated by the CPUC, which is charged with overseeing investor-owned public utilities. Given the lack of significant county involvement on this federal property, it may initially appear that the CPUC has the potential to be designated the Lead Agency for the CEQA review process. The CPUC was the Lead Agency for the CEQA review process for the recent SONGS Steam Generator Replacement Project. However, more recent information from SCE indicates that the cooling technology project will be considered a funding request, which would preclude the CPUC from being the CEQA Lead Agency.

CEQA is a regulatory statute that requires state or local regulatory agencies to identify, assess, avoid, or otherwise mitigate the significant environmental impacts from the proposed action—the addition of new cooling system technology. Another regulatory agency will have to be named the CEQA Lead Agency, since all of the proposed new wet tower systems will certainly trigger preparation of Environmental Impact Report, which along with other financial information, would ultimately support the process to determine if SCE can recover the costs associated with this cooling system technology. This Environmental Impact Report is also used by other state agencies to support their respective review and approval processes. Following finalization of the Environmental Impact Report, the Lead Agency will evaluate whether to certify CEQA compliance. This certification then supports its subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

While the review process and decision regarding cost recovery will likely be a lengthy, complex, and challenging process, no clear environmental barriers preclude completion of the CEQA review for the wet natural draft cooling tower technology option (for any water supply option). This statement does not imply that these closed-cycle cooling systems are free of potentially complex and costly operational demands.

California Coastal Commission

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

The CCC representatives (Detmer & Luster 2012) indicated that the Commission recognized in its previous approval of SONGS that there were no feasible options for the once-through cooling system at that time. The CCC believes that almost all of the cooling system technology replacement options present some sort of negative impacts. However, the CCC appears to be resigned to consider options that may present additional onshore impacts to help mitigate the offshore environmental consequences of the existing once-through cooling. 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 wet cooling towers.

The only serious issue may be related to the rather tall wet natural draft cooling tower structure and the even more visually intrusive unabated cooling tower plume, which is also a feature of the wet mechanical (forced) draft cooling towers. The CCC freely admitted that it would be very concerned with visual impacts from large cooling tower structures and towering plume columns. Therefore, this visual resource issue has the potential to be a barrier to securing the Commission's coastal development permit for the wet natural draft cooling and wet mechanical (forced) draft cooling towers. The lower profile plume abated hybrid towers would likely mitigate CCC visual resource concerns.

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

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

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

California State Lands Commission

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

- **Categorical Exemption** – applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.

- **Mitigated Negative Declaration** – applicable for work that poses minor environmental impacts, during noncritical seasons, for limited periods of time. The current SONGS marine mammal screening retrofit work has been reviewed and approved via *Mitigated Negative Declaration*.

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

The wet tower technologies could potentially require revisions of the current cooling system infrastructure in subaqueous lands. Commission representatives (DeLeon & Oggins, 2012) explained that recent experience regarding the progress of the lease approval process for nonnuclear facilities with existing once-through systems has been slow. Most of these facilities have requested extensions to continue to evaluate available mitigation strategies.

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. The wet cooling tower systems expected limited marine work may allow one to follow the more expeditious Mitigated Negative Declaration path, avoiding the longer, more complex Environmental Impact Report/CEQA review path. Consequently, the State Lands Commission lease will probably not represent a significant permitting hurdle for the wet cooling tower systems (for any water supply option).

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

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

The wet tower systems will require the current SONGS NPDES permit to be revised to address the expected changes to the cooling system discharge (blowdown) quantity and quality and compliance with the provisions of *California Once-Through Cooling Policy* requirements (reduction of impingement and entrainment impacts to marine resources). For a saltwater supply, this revision will reflect the expected increase in water treatment additives to the circulating water system, the significantly reduced saltwater withdrawal rates, altered storm water management features, and reduced discharge of a more saline blowdown effluent. The *California Once-Through Cooling Policy* requirements are inapplicable if the towers are supplied from freshwater and reclaimed water sources. The reduced discharge from this system is less saline, even considering tower operation with multiple cycles of concentration.

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

Both the SWRCB and SDRWQCB representatives (Morris, 2012 and Jauregui, 2012) explained that there are no obvious regulatory barriers regarding issuance of a revised NPDES permit for any of the cooling system options currently under consideration, including the saltwater wet tower 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 the *California Once-Through Cooling Policy* (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cycle cooling system). The saltwater cooling tower systems, however, can obviously demonstrate compliance with the *California Once-Through Cooling Policy*. The fresh or reclaimed water-supplied tower system completely avoids these compliance issues.

The SDRWQCB is ultimately a political body whose members are interested in reviewing information/evidence from the applicant and from their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process to the wet cooling tower systems (for any water supply option).

San Diego Air Pollution Control District

SONGS is located within the San Diego APCD, a state-designated nonattainment area for PM-10 and PM-2.5. That is, the District has failed to achieve compliance with the state ambient air quality standards for these pollutants. Given this regional status, the particulate emissions from the operation from a wet tower saltwater system can be expected to present a significant regulatory challenge, especially for the saltwater supply option.

From previous studies (Enercon, 2009), it is clear that a saltwater wet tower system (unabated) will generate particulate emissions in quantities that will exceed the major source threshold for PM-10 (100 tons/year). If the SONGS facility was already a major source of a criteria air pollutant (that is, maintaining a major source air permit), this threshold drops to the major modification level of 15 tons/year.

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

The San Diego APCD representative (Annicchiarico, 2012) explained that it maintains a registry of emission reduction credits for PM-10. There is no PM-2.5 registry. The total PM-10 tons/year emission reduction credit (that is, emission offsets) available in this District totals approximately 207 tons/year (see Table CC- 17) for an excerpt of this summary. These emissions are retained or owned by a number of different companies or organizations. The emission reduction credits are available for sale, or they can be retained by the Owners for future use. Alternatively, the interested party can generate additional emission reduction credits by shutting down additional sources of PM-10 either within their direct control or via separate third-party arrangements.

The saltwater cooling towers are expected to generate PM-10 emissions far in excess of 207 tons/year. It is likely that the fresh or reclaimed water options for closed cooling systems could also generate substantial PM-10-related emissions. To offset these PM-10 emissions from these tower systems, SCE would need to purchase these available emission reduction credits and potentially supplement this with other emission reduction credits. SCE could generate these emission reduction credits directly through PM-10 emission reductions within their own fleet of regulated sources, or they could encourage others to make similar reductions.

In addition to the issue of available emission offsets, there is the issue of visibility impacts on the nearest visibility sensitive areas, so-called Class I areas, which are comprised of national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence as of August 1977. The air quality and visibility impact of the saltwater towers particulate emission will have to be assessed on the closest Class I areas to SONGS (Agua Tibia Wilderness, San Gorgonio Wilderness Area, San Jacinto Wilderness, San Gabriel Wilderness, Cucamonga Wilderness, and Joshua Tree National Park). See Figure CC-1 for the location of these areas.

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

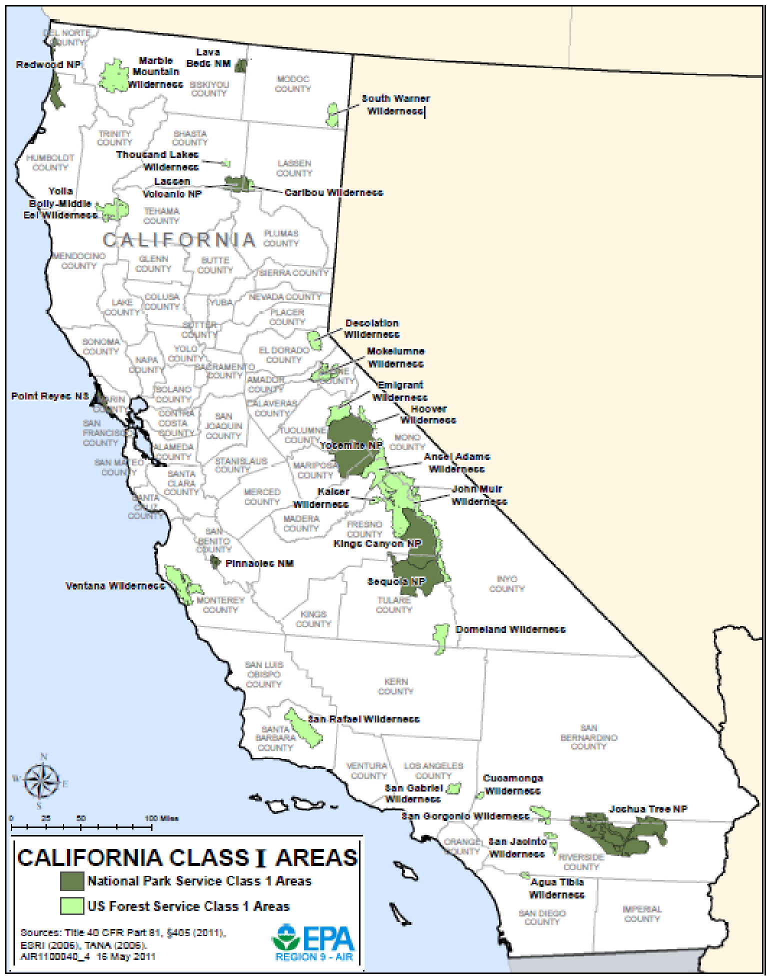


Figure CC-16. Southern California Class I Areas

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

San Diego County Department of Environmental Health

Because SONGS is located entirely on leased federal property that is part of the USMC's 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 (for example, 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 (Maschue, 2012). The 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 an SPCC and tank inspections.
- California Underground Storage Tank Monitoring Program – addresses fuel storage and leak detection in Mesa Complex and power block area.
- Hazardous Waste Storage and Treatment – includes small proprietary oil separation facility.
- Medical Waste Disposal – a county ordinance makes this an Environmental Health Department responsibility.
- Clean Air Act 112r Risk Management Plan – addresses onsite aqueous ammonia storage.
- Hazardous Material Business Plan – addresses storage of greater than 55 gallons of chemicals with potential for offsite impacts and addresses the facility's EPCRA responsibilities.

While the relevance of the various cooling system options to these six regulatory programs may not be immediately apparent, the wet cooling tower systems will require additional chemical additives, generate new waste streams, and potentially force the relocation of existing chemical and fuel storage systems. While these changes may result in a fairly involved revision process for many of associated management plans, this work does not appear to present any obvious county-sponsored regulatory barriers to the wet cooling tower systems (for any water supply option) or represent critical path permitting processes.

Other Agencies

In addition to the key regulatory agencies described above, there are a number of regulatory agencies that could potentially play a role in the permitting of the wet cooling tower options.

The construction of any saltwater wet cooling tower system will demand the addition of multiple large circulating water pipes, which will circulate water between the condensers in the power block area (SONGS Coastal Complex) and the cooling tower facility located in the Mesa Complex. Consequently, these pipelines will traverse the intervening Interstate-5 Highway, the North Coast Transit District Railway (used by Burlington Northern Santa Fe), and US Highway 101. While the tunnel boring methods can be used such that construction will be able to progress with no traffic or rail disruptions, there will be a follow-on engineering investigation and permitting activity. Based on previous studies (Enercon), it is likely that this effort will demand a full engineering and geotechnical survey that will subsequently support the process to secure multiple rights-of-way encroachment permits from Caltrans. The overall design and installation of these circulating water lines will be subject to considerable review to confirm compliance with each organization's guidelines, codes, and criteria. Given the undefined source of reclaimed and freshwater supplies to these cooling tower systems, it is not clear whether these water sources will require similar tunneling efforts.

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

The U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. The wet tower systems will likely be situated where the uplands and subaqueous lands have been previously disturbed, which would essentially preclude new impacts to previously undiscovered sensitive biological or cultural resources. Finally, the California Energy Commission, which has review responsibilities for new thermal facilities greater than 50 MW or for power increases of 50 MW or more, will be largely excluded from the permitting processes primarily because the wet natural draft cooling tower systems will not boost current power levels of the SONGS facility, let alone reach the necessary 50 MW increase in power that could mandate California Energy Commission review.

Summary

The external approval and permitting assessment for the wet tower systems identified a list of potentially applicable federal, state, and local permits and approvals that, not surprisingly, focused on their significant impacts to local air quality and the coastal zone. The permit lists are shown in Tables CC-2 through C-11. While the efforts to conduct a successful CEQA review and secure the requisite USACE Section 404 permit, CCC coastal development permit, State Lands Commission Lease, and NPDES permit modification will represent challenges, the air quality permitting process is constrained to be a clear fatal flaw for the saltwater supply option.

As noted earlier, San Diego APCD is a nonattainment area for PM-10, and the finite number of PM-10-related emission credits available fall well short of the amount necessary to offset the wet cooling tower-generated salt emissions. The gap is too large to encourage any attempts to generate additional particulate offsets from reducing the particulate emissions from local industrial sources of particulates. Without these offsets, SONGS would most likely not be able to secure the necessary major source air permit to support saltwater wet tower operation. The saltwater cooling tower technology cannot be considered a viable option. While the fresh and reclaimed water supply wet cooling tower options do not have a definitive fatal flaw, the aesthetic impacts and training impacts on the USMC training posed by the wet natural draft cooling and wet mechanical (forced) draft cooling tower systems may prove to be significant barriers to development.

4.1.2 Once-Through Cooling Intake Options

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

The initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable). This applicability of each permit/approval to the proposed once-through cooling intake options was evaluated. Those permits and approvals, 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 that would preclude the applicable permit or approval from ever being issued or granted. That is, the focus was to screen each applicable permit or approval for fatal flaws in the associated regulatory review process that would preclude the once-through cooling systems from further consideration and also evaluate overall permitting feasibility/

The assessment also focused on identifying the critical path (longest duration) initial preconstruction permitting processes, that is, those that support site mobilization, physical site access and initial earthwork/foundations for each 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.

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

- U.S. Marine Corps – Camp Pendleton
- California Public Utilities Commission
- California Coastal Commission
- California State Lands Commission
- State Water Resources Control Board
- San Diego Regional Water Quality Control Board
- San Diego Air Pollution Control District
- San Diego County Department of Environmental Health

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

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 once-through cooling intake systems will involve both land-based, nearshore, and offshore construction activities. The latter two sets of activities are the drivers for these permits. The deepwater intake, wedge wire, and substrate filtering systems will involve offshore cut and fill and/or tunneling processes, which will pose significant construction impacts to USACE jurisdictional waters. The relocated shoreline intake system and inshore fine screen systems will require nearshore activities and so also pose impacts to jurisdictional waters. The operational strategies and variable speed cooling pump systems are not expected to pose any appreciable impacts to jurisdictional water.

For minor impacts, the USACE has established a general permit program (Nationwide Permit) for a host of less significant work processes involving waters of the United States. The significant marine work associated with the deepwater offshore intake, initial intake relocation (inshore), inshore mechanical fine mesh, and substrate intake options preclude any Nationwide Permit permitting process for the associated marine-based construction. SONGS, therefore, would then be faced with securing the more complex individual Section 404/10 permits for these options. In addition to this federal permit, there is a somewhat parallel state regulatory review process which culminates in the issuance of a Clean Water Act Section 401 Water Quality Certificate by the California SWRCB. The certificate is issued before the Section 404 permit is issued by the USACE. The variable speed cooling pumps and operational strategies intake options will not demand either form of the Section 404 permit or the Section 401 Certificate.

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

This difficult situation 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 Section 404 will represent a critical path item to the completion of permitting for the impacted once-through cooling intake options.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any specific barriers or fatal flaws regarding the Section 404 permitting process for the applicable once-through cooling intake systems—deepwater offshore intake, initial intake relocation (inshore), inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems. (Lambert, 2012)

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

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 subject to a formal review and approval process by the USMC and U.S. Department of the Navy.

SONGS resides on land that is subdivided into two leases and nine easements. The SONGS lease grants the USMC and the U.S. Department of the Navy authority to review and approve physical improvements. USMC is also interested in offshore work in the area, since it could potentially impact USMC's offshore training activities.

While the once-through cooling intake system options are not expected to demand any additional federal land, they will generally add land-based structures. Consequently, it is possible that most of the once-through cooling systems (with the exception of the variable speed cooling water pumps and operational strategies) 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 subsequently 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 the 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.

If these once-through cooling systems (deepwater offshore intake, initial intake relocation [inshore], inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems) do 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 its offshore training regimen. It is unclear whether the USMC can (or would choose to) exert influence through its land-based lease and easement arrangement for work carried outside of its lease area.

California Public Utilities Commission

SONGS is regulated by the CPUC, which is charged with overseeing investor-owned public utilities. Given the lack of significant county involvement on this federal property, it may initially appear that the CPUC has the potential to be the designated the Lead Agency for the CEQA review process. The CPUC was the Lead Agency for the CEQA review process for the recent SONGS Steam Generator Replacement Project. However, more recent information from SCE indicates that the cooling technology project will be considered a funding request, which would preclude the CPUC from being the CEQA Lead Agency.

CEQA is a regulatory statute, which requires state or local regulatory agencies to identify, assess, avoid, or otherwise mitigate the significant environmental impacts from the proposed action – the addition of new cooling system technology.

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

So for the variable speed cooling water pump and operational strategies, the cooling tower systems will be mostly a perfunctory affair and, consequently, not represent a barrier to development.

The remaining once-through cooling systems (deepwater offshore intake, initial intake relocation [inshore], inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems) will probably trigger preparation of Environmental Impact Report – so some other regulatory agency will need to assume the responsibilities of Lead Agency. 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 Lead Agency will evaluate whether to certify CEQA compliance. This certification then supports their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

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

California Coastal Commission

The CCC has a broad mandate to protect the coastal resources of California that include the SONGS facility, including the Mesa Complex. Consequently, the CCC's environmental concerns address a broad range of subject matter including visual resources, land- and marine-based biological resources, land use and socio-economic concerns (for example, recreational use/access). Using a comprehensive approach, the Commission applies the policies of the California Coastal Act on a case-by-case and site-specific basis. That approach precludes screening any of the cooling system technology options from further consideration due to their being "unpermittable."

The CCC representatives (Detmer, 2012 and Luster, 2012) indicated that the Commission recognized in its previous approval of SONGS that there were no feasible options to the once-through cooling system at that time. The CCC believes that almost all of the cooling system technology replacement options present some sort of negative impacts. However, the CCC appears to be resigned to consider options that may present additional onshore 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 any of the once-through cooling intake systems.

Despite the lack of obvious fatal flaws, the deepwater offshore intake, initial intake relocation (inshore), inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems will certainly include significant marine construction efforts, so the CCC will be focused on the deleterious construction impacts on marine resources (for example, local fish, shellfish, vegetation, hard marine substrate, commercial fishing) and the potentially offsetting positive benefits associated with reducing operational entrainment impacts. These impacts may be reduced for those technologies that move the intake to deeper more distant locations — assuming these areas prove to offer a less rich biological 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, may be a factor for these largely submerged intake systems because some of the options will add new low profile features to the onshore or nearshore areas. The thermal discharge impact matters will be a sideline issue, since the discharge characteristics will remain largely unchanged with these once-through cooling systems.

The variable speed cooling water pump and operational strategies options will not pose any visual impacts. These technologies will also involve limited-to-no marine construction efforts, so the CCC will not identify any issues regarding negative impacts to marine resources (for example, marine substrate or commercial fishing).

The CCC consideration of these issues and their follow-on approval process will be parallel and influenced by the CEQA review process. That is, any application for a coastal development permit will be dependent on information that is generated by the associated Environmental Impact Report development process. Consequently, the CCC permit review process will also be coincident with CEQA and consequently, its duration will mirror the CEQA timeline (6 months–1 year). That period offers evidence that the coastal development permit could be a critical path permitting process.

California State Lands Commission

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

- Categorical Exemption – applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.
- Mitigated Negative Declaration - applicable for work that poses minor environmental impacts, during noncritical seasons, for limited periods 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 offshore intake, initial intake relocation (inshore), inshore mechanical fine mesh, offshore wedge wire, and substrate intake systems 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.

The operational strategies and variable speed cooling water pump system technologies are not expected to require revision of the cooling system infrastructure situated on subaqueous lands and so will likely follow the categorical exemption process mode, if evaluated at all by the Commission.

Commission representatives (DeLeon, 2012 and Oggins, 2012) explained the current process for nonnuclear coastal power plant lease holders to develop and implement their "implementation plan" to meet the *California Once-Through-Cooling Policy* performance goals has been very slow. Most of these facilities have requested extensions to continue to evaluate the potentially available mitigation strategies. This experience offers evidence that the associated CEQA review will not be an expeditious process. A review period of at least a year is a distinct possibility.

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

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

While the SWRCB has overall water-related permit authority for California's two active nuclear power stations, the SDRWQCB has the follow-on inspection and enforcement role for the issued permits. For SONGS, the SWRCB expects to modify the existing NPDES permits in support of the proposed deepwater offshore intake system. SONGS is currently operating on two administratively extended NPDES permits. The once-through cooling intake options will all pose some disruption to local land surfaces. These construction impacts will likely be addressed and managed (to the extent necessary) via the site's existing storm water best management practices and management plans, in lieu of seeking coverage under a general storm water permit for construction activities. New impacts to jurisdictional streambeds and related water discharge permits are not expected. The deepwater 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 may be reduced if the area proves to be less biologically productive, primarily because water withdrawal will occur in a deeper less biologically active region. Recent studies suggest that there is little evidence of commonly expected trends. Thermal discharge impacts to aquatic life will remain largely unchanged.

The relocated shoreline intake system construction activities will potentially generate significant, temporary, and permanent water quality and marine habitat (intertidal and sub-tidal) impacts. Reconfiguring the shoreline intake system, installing breakwaters, and performing dredging will result in significant localized turbidity impacts and some temporary and permanent loss of the biological productive nearshore marine habitat area.

Operationally, the relocated shoreline intake system in itself will not reduce impingement-related cooling system impacts. It has the potential to create a condition that reduces the impingement and entrainment protection, since the advantages provided by the current velocity cap will be lost. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Consequently, the entrainment impacts may be more significant given the new shoreline location, and the thermal discharge impacts to aquatic life will remain largely unchanged.

Inshore fine screen intake system construction activities will potentially generate significant, temporary water quality and marine habitat (intertidal and sub-tidal) impacts. Adding the screen house and tie-ins to the existing intake line will result in some localized turbidity impacts and temporary and permanent loss of the biological productive nearshore marine habitat area.

Operationally, the inshore fine screen intake system will reduce impingement and entrainment influences through the fish collection and return system. This system will continue to use the offshore intake system, and it will not reduce the overall water withdrawal or discharge rates. The thermal discharge impacts to aquatic life will remain largely unchanged.

Offshore modular wedge wire screen system construction activities will potentially generate significant, temporary water quality and marine habitat (intertidal and sub-tidal) impacts. Installation of the wedge wire modular screens and connecting piping via the cut-and-fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a considerable area of biological productive marine habitat.

Operationally, the offshore wedge wire screen system will effectively reduce the impingement impacts associated with once-through systems. This system will not, by itself, reduce the overall water withdrawal or discharge rates. However, the entrainment-related impacts will also improve due to the much-reduced screen slot velocity (less than 0.5 fps as compared to current velocity cap inlet velocity of 1.8 fps) so that the eggs/larvae are more likely to be carried past the screens by the current and less likely to enter the screens. The thermal discharge impacts to aquatic life will remain largely unchanged.

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

Operationally, the substrate filtering intake system will significantly reduce the impingement impacts, relative to current velocity cap system. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Entrainment-related impacts will be reduced primarily because of the substrate filtering action and the deeper, potentially less biologically active region of the withdrawal. Thermal discharge impacts to aquatic life will remain largely unchanged.

The operational strategies could pose some minor nearshore construction impacts, and they will alter some aspects of intake operation. However, these strategies will not change the peak water withdrawal rates nor appreciably change the water treatment system.

The reduced water withdrawal rates associated with the variable speed cooling water pump option will occur in response to changes in ambient conditions and regional power demands. Reduced cooling water needs will be associated with a parallel improvement in impingement and entrapment. This system may require the current SONGS NPDES permits to be revised to address the expected changes to the cooling system discharge quantity and address provisions of the *California Once-Through-Cooling Policy* requirements (reduction of impingement and entrainment impacts to marine resources). There will ostensibly be no changes to the current water treatment system, since this option can be characterized as a once-through system with more flexible withdrawal rates.

The cooling water withdrawal and discharge rates will remain essentially unchanged for these once-through cooling options, so any revisions to the current SONGS NPDES permits will be limited to compliance provisions of *California Once-Through-Cooling Policy*. 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 these once-through cooling technology options. 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 the *California Once-Through-Cooling Policy* (that is, through-screen velocity of 0.5 fps or lower, and entrainment/impingement levels equivalent to those associated with a closed-cooling cycle system). The once-through cooling intake systems entrainment reduction performances (with the possible exception of the substrate system) fall short of closed-cycle cooling system attributes.

The SWRCB is ultimately a political body whose members are interested in reviewing as much information/evidence as possible from the applicant and from their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process for any of the once-through cooling intake systems.

San Diego Air Pollution Control District

SONGS is located within the San Diego APCD, a state-designated nonattainment 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 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 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 once-through cooling intake systems —systems that are 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 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 (for example, 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 (Maschue, 2012). The 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 an SPCC plan and tank inspections.

- California Underground Storage Tank Monitoring Program – addresses fuel storage and leak detection in the Mesa Complex and power block area.

- Hazardous Waste Storage and Treatment – includes a 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 once-through cooling intake systems 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 system will change in some instances and so will the operational waste generation volumes. These wastes will be composed of nonhazardous/recyclable construction wastes and marine biological wastes from periodic cleaning operations of marine intake systems. Therefore, construction and 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 offshore systems (deepwater intake, wedge wire screen, substrate filtering) are likely to temporarily and permanently disturb sensitive marine habitat and also potentially reduce overall 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 the CEQA review process, but these attributes are not expected to trigger the need to secure a 2081 Incidental Take Permit because of the lack of marine-based endangered species (Enercon 2008). Since these once-through cooling intake options primarily involve onshore and nearshore work in already developed areas and offshore work in submerged lands, it is unlikely that cultural or historic resources (land-based) will be impacted.

Installation of the associated onshore, nearshore, and offshore facilities will not appreciably alter the overall profile of the SONGS facility and certainly not require significantly tall or oversized construction equipment. These considerations will preclude significant interactions with California Department of Transportation - Caltrans (roadway crossings, encroachments, oversized vehicles) and the Federal Aviation Administration

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

Finally, the California Energy Commission, which has review responsibilities for new thermal facilities greater than 50 MW or for power increases of 50 MW or more, will be largely excluded from the permitting processes primarily because the deepwater offshore intake system will not boost current power levels of the SONGS facility, let alone reach the necessary 50 MW increase threshold that could mandate California Energy Commission review.

4.1.2.2 Summary

The external approval and permitting assessment for the once-through cooling intake systems identified a list of potentially applicable federal, state, and local permits and approvals for each system. For the variable speed cooling water pump and operational strategies systems, this list is rather short because of the limited nature of the construction work and largely unchanged operating characteristics associated with these two systems. The only substantive permits or approvals that will potentially apply to these two intake technology options are the CEQA process and the amendment to the existing NPDES permits. Both the CEQA review and NPDES amendment processes are not expected to be contentious or lengthy. While this cooling system option may provide only limited improvements relative to the *California Once-Through-Cooling Policy* performance expectations for impingement and entrainment, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria that would preclude this option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws or feasibility constraints in the associated regulatory review process that would preclude the variable speed cooling water pumping system or operational strategies from further consideration.

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

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

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

The assessment also indicated that the Section 404 permit and the CPUC-sponsored CEQA review process will likely represent the critical path review and approval processes (approximately 12 months) for the deepwater offshore intake system. This critical path process does not represent a barrier to development of these cooling technology intake systems.

4.2 Impingement/Entrainment Design

4.2.1 Closed-Cycle Cooling Systems

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

The facility water intake flow is assumed to be directly proportional to impingement and entrainment effects. Therefore, reductions in intake flow rate are considered equivalent to reductions in impingement and entrainment. At SONGS Units 2 and 3, the existing once-through cooling systems would be replaced with closed-cycle cooling towers for all but the safety-related saltwater cooling system, which would remain cooled by the auxiliary offshore intake system using once-through cooling. The saltwater cooling system represents approximately 2–5 percent of the total plant cooling water flow rate. Retrofitting the existing once-through cooling systems for Units 2 and 3 with closed-cycle cooling towers would therefore reduce cooling water withdrawals from the Pacific Ocean by approximately 95–98 percent. Impingement and entrainment are expected to be reduced by a similar proportion, resulting in compliance with the proposed *California Once-Through-Cooling Policy* requirements.

4.2.2 Deepwater Offshore Intake

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

A systematic assessment of the temporal and spatial patterns of nearshore distribution and abundance of pelagic fishes off the southern California coast was conducted by Allen and DeMartini (Allen and DeMartini, 1983). Pelagic fishes were sampled at two 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 5–11 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 to 16-meter and 18 to 27-meter depth blocks. More importantly, the observations suggested that there is no discernible trend of decline in fish abundance with distance and depth offshore within 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 halibut 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, occurring 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). Near-shore 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 instance, yolk-sac larvae tended to be most abundant in the depth block of 22–45 meters and least abundant in the shallow block of 6–9 meters and deeper block of 45–75 meters. Preflexion larvae were significantly more abundant in 12 to 22-meter and 22 to 45-meter depth blocks than elsewhere, and tended to be least abundant in shallow blocks of 6-9 meters and 9–12 meters. Flexion stage larvae were distributed similarly, except that only the relatively high abundance in 22–45 meters was statistically distinguishable from the very low abundances in 6–9 meters and 9–12 meters. Abundances of postflexion larvae also tended to be higher in mid-water depth blocks of 12–22 meters and 22–45 meters.

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.

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).

Entrainment

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 *California Once-Through-Cooling Policy* requirements.

Impingement

The relocation of the offshore velocity caps to a deeper location does not in itself demonstrate compliance with the *California Once-Through-Cooling Policy* requirements. Compliance with the impingement reduction requirement will likely require the deepwater offshore velocity caps to be designed with a velocity of 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.

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 meters (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.

4.2.3 Initial Intake Relocation

The current SONGS offshore velocity cap system reduces the entry of fish into the intake system by establishing a radial flow field around the inlet, which reduces fish entrainment to some degree when compared to a shoreline open channel intake. The application of a new shoreline intake will no longer retain the marine resource benefits associated with the current offshore intake system and therefore it is deemed a fatal flaw.

The detailed evaluation of impingement and entrainment impacts realized by the onshore intake is as follows:

- The shoreline intake technology offers no impingement or entrainment mitigation benefits when compared to the existing velocity cap technology. The system withdraws water from a more biologically productive nearshore area.

- The shoreline intake maintains an open channel to the open ocean environment for fish and other organisms to enter the pumphouse.

- The system offers no reduction in water withdrawal rates.

- The shoreline intake includes a screen system that will be more likely prone to overloading and failure, due to the increased debris loading with a shoreline location.

4.2.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

There are six flow-through-type traveling water screens per unit with a flow-through screen velocity of 3 fps. In addition, the existing traveling screens have mesh openings of 3/8 inch (9.5 millimeters), which is not a barrier to fish eggs or larvae. With the installation of fine mesh screen panels at the existing pump house that have mesh openings of 1 to 2 millimeters, the entrainment impacts can be reduced. Survival rates for eggs and larvae impinged on the screens can be improved by the addition of a fish collection and return system to the existing traveling screens at the onshore pump intake. Fish and larvae dislodged from the collection buckets can be discharged back to the open sea through the existing fish return system. Past studies (EPRI, 2008) indicated that while the exclusion rate for the larval organisms is high when using the fine mesh system, the survival rate is relatively low for two dominant species in the area, anchovy and queenfish—approximately 9.9 and 16.7 percent, respectively. Nonetheless, any improvement in entrainment over the existing condition is a plus, since currently the entrainment loss is administratively 100 percent.

However, use of the fine mesh screen panels will also result in a substantial increase of debris loading on the converted screens. The existing screens are likely not to be able to handle this increase, as has happened on some power projects, which experienced screen failures following a screen mesh retrofit from coarse mesh to finer mesh of 2 millimeters square. Mitigating this problem demands the addition of a new screen house next to the existing pump intake to produce the desired low approach velocity (approach velocity must be less than 1 fps for low debris volume and less than 0.5 fps for high debris volume). The tie-in to the new screen house would be through underground pipe connections to the existing intake suction line, as shown in Figure IFMS-1. All the new screens in the screen house will be continuously rotating and will come with a fish collection and return system. Pipeline rerouting will fully preserve the function of thermal shock treatment for offshore pipeline biofouling control, as the rerouting does not change its current scheme.

The fine screen mesh proposed will have rectangular slot screens, such as either 1 millimeter x 4 millimeters or 2 millimeters x 6 millimeters. This creates an effective mesh opening of 1 to 2 millimeters, which reduces entrainment of fish eggs and larvae. The rectangular mesh size has better hydraulic performance in terms of reduced head loss, since it has a larger screen open area as compared to the square mesh of 1 millimeter x 1 millimeter or 2 millimeters x 2 millimeters.

With the fine mesh in place, eggs/larvae impinged on screen mesh will need to be collected and returned back to the ocean. As the current louver and vane arrangement provides no benefits in this regard, each traveling screen will need to be equipped with a fish collection and return system and will need to rotate continuously. Two pressure sprays will be installed. The low-pressure spray (approximately 10 psi) is expected to push off collected fish and eggs/larvae to the return piping. A follow-on high-pressure spray is employed to dislodge debris.

Once the new screen house is installed and operational, the existing rake and flow through screens can be removed.

4.2.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

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

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

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

Impingement Reduction

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

Entrainment Reduction

The wedge wire screen technology is a passive screening system with no moving parts and discourages juvenile/adult fish from entering the intake system because of its narrow screen slot size and low slot through-flow water velocities. Early studies and field evaluations of wedge wire screens have concluded that they have little effect on the number of small fish eggs and larvae entrained. More recent studies focused on reductions in entrainment of larger larvae and reported significant benefits by focusing the protection efforts on older larvae that have a greater likelihood reaching maturity. The recent assessments target the *relative* ecological value of entrainment losses with the use of equivalent age 1 fish (the number of 1-year-old fish that would have resulted had eggs, larvae, and juveniles not been lost to entrainment) as the measurement metric, to ensure that mitigation efforts are actually effective at protecting the fish populations. The two particular studies (Enercon, 2010, Normandeau, 2009) have specific entrainment benefit estimates for wedge wire screens using the 1-year-old equivalents approach. In the Enercon study performed for Indian Point 2&3

(Enercon 2010), the potential percent reduction of monthly and annual equivalent age 1 impingement and entrainment losses from the regulatory baseline due to use of wedge wire screens with through-slot velocity of 0.5 fps were provided. The annual entrainment loss reduction estimate of 88.5 percent for 1-millimeter slot, 89.8 percent for 2-millimeter slot, and 89.6 percent for 6-millimeter and 9-millimeter slots, and overall 99.9 percent impingement reduction for all screen slot sizes (1 millimeter to 9 millimeters).

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

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

Even though the total volumetric flow withdrawal will be the same, the wedge wire screens will be relatively more effective in reducing entrainment of the fish eggs and larvae compared to the existing velocity cap intake, which has a relatively high inlet velocity of approximately 1.8 fps. The system effectiveness improves if there are local sea current velocities sweeping the screen surface, especially when sea current velocities are greater than slot through-flow velocities. Screen performance is expected to be variable depending on the season and aquatic life species. Given these uncertain attributes, it may be necessary for SONGS to conduct further studies and marine monitoring to assess the magnitude of these entrainment benefits to evaluate their compliance with *California Once-Through-Cooling Policy* requirements. The impact of various wedge wire screen sizes, as shown in the review of various references on wedge wire screen performances on different screen slot sizes (Section 3.6.2). The smaller slot size (such as 2 millimeters) will offer the same or better entrainment reduction performance as compare to the coarse slot openings (such as 6-millimeter or 9-millimeter slot). However, smaller slot size screens will likely experience more debris clogging and biofouling potential than coarser screens and, as such, an in situ testing of screens with both 2-millimeter slot and 6-millimeter slot will be conducted before an optimum screen size is selected.

4.2.6 Operational Strategies to Reduce Impingement and Entrainment

As described in Section 3.7, there are several operational strategies available, namely cooling water flow rate reduction, continuous fish-handling operation, and fish deterrent systems. However, as described below, none of these strategies would suffice in meeting *California Once-Through-Cooling Policy*.

4.2.6.1 Cooling Water Flow Rate Reduction

SONGS is a baseload plant and normally does not vary its cooling water circulating flow (or water withdrawal rate), except during maintenance, repair, and refueling. The potential opportunity to achieve lower cooling water withdrawal rates may occur during off-peak seasons when power demands are lower. However, this period may not coincide with the fish spawning season. Typically, a reduction in water withdrawal rates will likely improve the entrainment loss and associated impingement mortality proportionally. For the correlation between intake flow reduction and the percent plant unit de-rate, as described in Section 4.2.8, the percent of condenser flow reduction (about the same as the percent intake flow reduction) equals approximately the percent of plant unit de-rating, with the condenser temperature rise remains constant..

Flow reduction capability is limited by SONGS circulating water system equipment and operating constraints that consist of the following: (1) single-speed cooling water pumps need to operate above their minimum continuous flow rate, (2) a minimum number of operating pumps are required (two per unit) to supply cooling water to the condensers, and (3) there are limits on the ability of valve throttling to reduce flow. These constraints will limit the ability of the system to reduce flow and lower impingement and entrainment losses proportionally to an acceptable level commensurate with the *California Once-Through-Cooling Policy* requirements.

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

4.2.6.2 Continuous Fish-Handling System Operation

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

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

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

4.2.6.3 Fish Deterrent System

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

For air bubble curtain, the deployment of such a system at SONGS will require the installation of a ring diffuser (over 80 feet in diameter) around each offshore velocity cap to supply a significant amount of compressed air over a substantial offshore distance—a somewhat impractical matter. In addition, the influence on aquatic life is unknown and would require follow-up site-specific field studies.

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

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

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

4.2.7 Source Water Substrate Filtering/Collection Systems

The current SONGS offshore velocity cap system permits fish and other marine species to enter the offshore intake pipe and be carried to the onshore pump intake structure. The current onshore pump intake structure is equipped with an angled traveling screen system, and at end of intake forebay, a fish lift to collect and transfer fish and other marine life for transport back to the Pacific Ocean. Use of the source water substrate filtering collection system, in lieu of the offshore velocity cap, effectively screens egg, larvae, and juvenile/adult fish from entering the cooling system. The existing traveling screens will remain to filter out debris from flows from the auxiliary offshore intake system, which is a small velocity cap intake located approximately 92 feet shoreward from the existing main velocity cap intake (will be capped).

The source water substrate filtering collection system technology is a passive system with no moving parts. Eggs, larvae, and juvenile/adult fish are screened from entering the system by a combination of filtration through bottom sediments and low through-flow water velocities. The design velocity is not expected to exceed 0.5 fps and therefore meets the Track 1 impingement criterion associated with *California Once-Through-Cooling Policy*. Even though the total volumetric flow withdrawal will be the same, the substrate filtration and lower than 0.5 fps withdraw velocities will result in less fish egg/larvae entrainment in comparison to the existing system.

4.2.8 Variable Speed Cooling Water Pumping Systems

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

Being a base-load plant, SONGS is designed to operate at full capacity, except during maintenance, repair, and refueling. Some benefits of the variable speed pump system may be attained by reducing load generation during off-peak seasons when power demand is lower. However, it is not expected that the off-peak season load reduction and the corresponding reduction in entrainment loss and impingement mortality attainable with the use of variable speed pumps alone will reach a level commensurate with that of a closed-cycle wet cooling system. For instance, assuming conservatively that the off-peak season lasts 6 to 8 months out of a year, and generation load and the corresponding cooling water flow could be reduced by 30 percent (the current practical limit of large-capacity variable speed circulating water pumps), this would result in a reduction of at most 15 to 20 percent on the annual withdrawal flow volume and associated impingement mortality and entrainment loss. In addition, according to an SCE field study from 2006 to 2007 (SCE 2008, the egg and larvae concentrations for various species are highest from April to June, with the larvae for sea bass peaking in July and August (2006). The varying seasonality of different larval fish near SONGS' intake suggests that not all organisms would benefit equally from the use of variable speed pumps to achieve flow reduction during off peak seasons.

Some level of flow reduction can be a direct result of lower intake water temperature. According to SONGS 2008, the design condenser inlet temperature is 64°F. From operation data in years 2004 to 2007 for the circulating water system, the observed annual condenser inlet temperature ranges from approximately 53°F to approximately 75°F. With the design condenser inlet temperature lying halfway between the low and high measurement of the years and a tight band of seawater temperature range, the ability to reduce the circulating water flow rate to a meaningful level for full load operation is very limited. Therefore, it is unlikely that a variable speed pump technology will be viable for SONGS to achieve noticeable flow reduction to improve impingement and entrainment for a full load plant.

In theory, the through-screen velocity at the traveling water screens could be lowered to 0.5 fps or less. The cooling water flow would have to be reduced by 83 percent or more. This severe flow reduction would render the circulating water pumps inoperable due to the current practical limit of 15 to 30 percent flow reduction achievable with the variable speed pump technology for pumps in this size range. Even if there was a practical means to deliver this flow to the plant, the reduction in output of the plant would be reduced by over 50 percent. Finally, an EPRI study (EPRI 2007) concludes that such reduction in load may have significant impacts on the electric generation supply to the grid when most needed.

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

Because of its potential marginal improvements of impingement and entrainment impacts, the variable speed pump technology, when used alone, is deemed inadequate to meet the requirements of the *California Once-Through-Cooling Policy* requirements.

4.3 Offsetting Environmental Impacts

4.3.1 Closed-Cycle Cooling Systems

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

In some cases, regulatory agencies may be so constrained by their regulatory foundation that offset opportunities are limited or unavailable. The San Diego APCD, for example, has the regulatory authority to offset new air emissions in the 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 that supports a more flexible approach to using environmental offsets to generate the maximum net environmental benefit.

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

The following sections evaluate the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic issues associated with construction and operation of each closed-cycle system technology. Consequently, following discussion of the individual environmental subject areas, the related consequences are categorized as having either positive or negative small, moderate, or large impact significance. The specific criteria for this categorization are shown below.

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

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

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

The results of these evaluations and impact categorizations are subsequently summarized in Tables CC-12 through CC-16.

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

Air

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

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

The air-cooled draft tower systems will likely have a minor negative impact on SONGS overall plant efficiency, due to increases in cooling water temperature relative to the existing once-through system. The resulting decreases in power generation may result in minor increases in greenhouse gas or other pollutant emissions locally, if the replacement power comes from fossil power sources. The towers' operational impacts collectively represent a small negative impact.

Surface Water

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

The saltwater-supplied dry tower system will substantially reduce seawater withdrawal rates even relative to a wet closed-cycle cooling system, because there are no blowdown, drift, or evaporative losses. After the initial charge of the system, any makeup will be related to maintenance matters and system leakage. The freshwater and reclaimed water use rates will be further reduced relative to the seawater withdrawal because these will likely be charged from freshwater or reclaimed water sources.

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

Groundwater

Onsite groundwater resources will not be used in support of dry tower operation. USMC policy requires the maintenance of a seaward gradient of the groundwater table at all times to prevent intrusion of saline water into freshwater aquifers. This policy prohibits the withdrawal of considerable amounts of groundwater stored in alluvium below or near sea level. Past groundwater withdrawals have fully used the basin's potential up to the policy limits. Future groundwater usage from the San Onofre Basin is expected to remain the same as past usage with no projected changes (SONGS May 2007). This is interpreted to indicate that freshwater groundwater is not available at SONGS.

Waste

Construction-related wastes, demolition wastes, and recyclable metals associated with the use of the Mesa Complex and the minor modification of the existing inshore portions of the intake system will be generated. The proposed location of the towers, most of the Mesa Complex, will require demolition of a substantial number of existing structures and some related earthwork. The associated earthwork material balance has not been prepared for this initial phase of the assessment.

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

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

Noise

Previous studies have concluded from consultations with the county of San Diego, city of San Clemente, and Camp Pendleton that noise levels from industrial operations should not exceed 70 dBA at the nearest public receptor (Tetra Tech, 2008). Noise impacts from construction activities associated with the passive draft dry air cooling and mechanical (forced) draft dry air cooling towers could be significant, but distance to the nearest offsite public receptor (new Camp Pendleton Housing to the northwest) is expected to provide sufficient mitigation. The limited effort to modify the nearshore intake system is not expected to generate significant noise impacts for land-based locations. Buffer areas around this marine construction zones could be established for safety reasons, but it is unlikely they will be needed. Given the potential for noise impacts to the USMC housing and along the immediate shoreline recreational areas, the construction activities could pose a small negative impact.

Operational noise levels are expected to increase because of the passive draft dry air cooling tower flow-related noise. The mechanical (forced) draft dry air cooling towers will also generate transformer and fan noise. While the noise-related impacts to local Mesa Complex office buildings could rise above the target exposure limit, noise limits cannot be enforced on SONGS property (Enercon). The impact to the USMC housing areas is expected to be below 70 dBA. The increase in operational noise levels from passive air cooling draft cooling tower operation and the resulting impacts to occupied Mesa Complex areas translate to an operational small negative impact.

Land Use

Construction activities associated with this system will essentially occupy the entire Mesa Complex area and impact a small area near the existing inshore portion of the intake system. The addition of these dry/air-cooled cooling towers to the Mesa Complex will represent a fundamental change to an area that had not been used for direct power plant operations. The construction activities will likely disturb significant portions of the Complex that were occupied by office, storage, and parking facilities or previously unoccupied or undisturbed.

The marine work associated with modification of the intake system to support the limited water withdrawal needs of these cooling systems is insignificant and will present no land use impacts. However, the significant construction activities in the Mesa Complex and the efforts to route the circulating water lines and other utilities from the ocean-side power plant underneath the intervening road systems to the Mesa Complex collectively represent a moderate construction-related negative impact for these cooling technology options.

The passive draft dry air cooling and mechanical draft dry air cooling tower systems and the modified inshore intake system collectively present significant changes for the existing land use. The Mesa Complex will be become part of the operating power plant with all of the attendant security and maintenance provisions. The final system will include a water pipeline and utility corridor connecting the power plant with the cooling systems in the Mesa Complex. Given these impacts, the passive air cooling draft cooling tower system is expected to offer an operational moderate negative impact.

Marine Ecological Resources

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

Operationally, the saltwater-supplied air-cooled draft cooling system can effectively mitigate impacts to marine resources by limiting the through-screen velocity to less than 0.5 fps and reduce entrainment impacts because of its substantially reduced water withdrawal rate. The freshwater or reclaimed water-supplied tower system completely avoids a seawater withdrawal and so completely avoids operational impacts to marine resources. Consequently, the passive dry/air cooling draft cooling tower system will, operationally, offer large positive impact relative to the current situation.

Terrestrial Ecological Resources

Much of the lands that will be used for the air-cooled cooling tower systems have been altered during the course of development of the Mesa Complex. Consequently, the area to be developed has limited habitat potential and limited wildlife use (Enercon). Construction of the tower system will present, at most, a small negative impact.

The fully constructed mechanical dry air cooling or passive draft dry air cooling tower system will be situated in a largely developed area, so there is limited potential for permanent loss of passive air cooling draft habitat areas or other areas with significant ecological value or sensitivity. This also equates to an operational small negative impact.

Cultural and Paleontological Resources

As described above, construction of the air-cooled cooling tower systems will largely occur in previously disturbed lands that are unlikely to harbor cultural or paleontological resources. Installation of the modified intake system involves minimal construction in already developed area. The Mesa Complex is also a well developed area, so there is little or no potential to discover new cultural or paleontological resources during the course of construction. Consequently, construction of the mechanical dry/air cooling or passive draft dry air cooling tower systems could present a small negative impact.

The fully constructed tower systems (draft dry air cooling or passive draft dry air cooling) will be situated in a largely developed area, so there is limited potential for permanent loss of areas with significant cultural or paleontological resources.

Visual Resources

Construction of the tall dry air cooling towers in the Mesa Complex will probably represent a significant visual impact during construction and therefore result in a large negative impact. Construction of the lower profile passive draft dry air cooling in the same areas will probably not represent a significant visual impact during construction and, therefore, at most will represent a small negative impact.

The relatively tall profile dry air cooling system will not produce a visible plume nor increase local fogging conditions. However, the operational visual resource impacts will be significant by virtue of the tall tower structures alone.

The relatively low profile air-cooled system will not produce a visible plume nor increase local fogging conditions. There are no operational visual resource impacts with the passive draft dry air cooling system.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during construction of the air-cooled tower systems. The not inconsequential construction period means that related traffic impacts will not be transitory and the peak workforce may be significant. Access to the construction site is via Basilone Road—a small four-lane road. This road is currently shared by SONGS employees, military personnel, and local park users and prone to congestion at times. Consequently, the transportation-related construction impacts should be considered a moderate negative impact.

Operationally, the air-cooled draft tower system will increase maintenance and service requirements, but any related maintenance staff increases are expected to be modest. The air-cooled system will not produce a visible plume nor present supplemental fogging or icing impacts. Consequently, the draft dry air cooling or passive draft dry air cooling systems will not present any significant operational ground level transportation impacts. The tall draft dry air cooling towers could still impact USMC training helicopter operations.

Socioeconomic Issues

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

Operational maintenance staff levels will increase in response to increased cooling tower and intake system maintenance, but will not result in any related community service or resource concerns.

The impact to the local housing and land prices is not expected to be very significant in that this is a long-established and well-known industrial area, though addition of the closed-cycle cooling systems may expand the footprint of that industrial area into an area previously occupied by office buildings and storage facilities. In addition, most of the nearest housing and land is part of Camp Pendleton, and therefore, not available for sale to the public.

Summary

Tables CC-12 and CC-13 summarize the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the draft dry air cooling and passive draft dry air cooling tower systems. With the exception of the visual resource and land use impacts, the construction impacts can be characterized as generally having small negative impact significance in that much of the work will progress on previously developed land or in marine areas that are on, or near, previously disturbed nearshore subaqueous land.

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

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

Air

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

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

The particulate (salt drift) emission may also pose visibility impacts on the nearest visibility sensitive areas, so-called Class I areas, which comprise national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence as of August 1977. The closest Class I areas to SONGS are Agua Tibia Wilderness, San Gorgonio Wilderness Area, San Jacinto Wilderness, San Gabriel Wilderness, Cucamonga Wilderness, and Joshua Tree National Park. See Figure CC-1 for the location of these areas.

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

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

Surface Water

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

The saltwater tower system will substantially reduce seawater withdrawals rates approximately 95 percent reduction). Obviously, the fresh and reclaimed water usage rates will be further reduced relative to the seawater withdrawal because of the increased cycles of concentrations that are possible for these higher quality water resources.

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

Groundwater

Onsite groundwater resources will not be used in support of wet tower operation. USMC policy requires the maintenance of a seaward gradient of the groundwater table at all times to prevent intrusion of saline water into freshwater aquifers. This policy prohibits the withdrawal of considerable amounts of groundwater stored in alluvium below or near sea level. Past groundwater withdrawals have fully used the basin’s potential up to the policy limits. Future groundwater usage from the San Onofre Basin is expected to remain the same as past usage with no projected changes (SONGS, May 2007). This is interpreted to indicate that freshwater groundwater is not available at SONGS.

Waste

Constructions-related wastes, demolition wastes, and recyclable metals associated with the use of the Mesa Complex and the modification of the existing inshore portions of the intake system, will be generated. The proposed location of the towers, a significant portion of the Mesa Complex, will require demolition of a substantial number of existing structures and some related earthwork. The associated earthwork material balance has not been prepared for this initial phase of the assessment.

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

Noise

Previous studies have concluded from consultations with the county of San Diego, city of San Clemente, and Camp Pendleton, that noise levels from industrial operations should not exceed 70 dBA at the nearest public receptor (Tetra Tech, 2008). Noise impacts from construction activities associated with the wet natural draft cooling towers could be significant, but distance to the nearest offsite public receptor (new Camp Pendleton Housing to the northwest) is expected to provide sufficient mitigation. The construction of the redesigned nearshore intake system is not expected to generate significant noise impacts for land-based locations or marine areas). Given the potential for noise impacts to the USMC housing, the construction activities could pose a small negative impact.

Operational noise levels are expected to increase because of related motors, power transmission units, and fans for the mechanically driven wet tower systems and cascading water effects for all of the wet towers. While the noise-related impacts to local Mesa Complex office buildings could rise above the target exposure limit, noise limits cannot be enforced on SONGS property (Enercon). The expected impact to the USMC housing areas is expected to be below the 70 dBA threshold. The increase in operational noise levels from wet cooling tower operation and the resulting impacts to occupied Mesa Complex areas translates to an operational small negative impact.

Land Use

Construction activities associated with this system will be confined to the Mesa Complex area and along a small area in the inshore area of the existing intake system. The addition of wet cooling towers to the Mesa Complex will represent a fundamental change to an area which had not been used for direct power plant operations. The construction activities will likely disturb significant portions of the Complex that were occupied by office, storage, and parking facilities or previously unoccupied or undisturbed.

The marine work associated with modification of the intake system to support the reduced water withdrawal needs of these cooling systems is insignificant and will pose no land use impacts. However, the significant construction activities in the Mesa Complex and the efforts to route the circulating water lines and other utilities from ocean-side power plant underneath the intervening road systems to the Mesa Complex collectively represents a moderate construction-related negative impact for these cooling technology options.

The wet cooling tower systems and the modified inshore intake system collectively pose significant changes to the existing land use. The Mesa Complex will be become part of the operating power plant with all of the attendant security and maintenance provisions. The final system will include a water pipeline and utility corridor connecting the power plant with the cooling systems in the Mesa Complex. Given these impacts, the wet cooling tower systems are expected to offer a moderate term negative impact.

Marine Ecological Resources

Reconfiguring inshore portions of the existing intake system to supply saltwater to the wet cooling towers will result in minor localized turbidity impacts and some minor impacts to an already developed nearshore marine habitat area—a small negative impact. Construction of the freshwater and reclaimed water-supplied tower system will have no effect on marine resources—a moderate positive impact, relative to other options.

Operationally, the saltwater wet cooling system can effectively mitigate impacts to marine resources by limiting the through-screen velocity to less than 0.5 fps and reduce entrainment impacts because of its substantially reduced water withdrawal rate. The fresh or reclaimed water-supplied tower system completely avoids a seawater withdrawal and so completely avoids operational impacts to marine resources. Consequently, the wet cooling tower system will, operationally, offer large positive impact relative to the current situation.

Terrestrial Ecological Resources

Much of the lands that will be used for the wet cooling tower system have been altered during the course of development of the Mesa Complex. Consequently, the area to be developed has limited habitat potential and limited wildlife use (Enercon). Construction of the tower system will pose, at most, a small negative impact.

The fully constructed tower system will be situated in a largely developed area, so there is limited potential for permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity. This also equates to an operational small negative impact.

Cultural and Paleontological Resources

As described above, construction of the air-cooled cooling tower systems will largely occur in previously disturbed lands that are unlikely to harbor cultural or paleontological resources. Installation of the reconfigured intake system involves minimal construction in an already developed area. The Mesa Complex is also a well developed area, so there is little or no potential to discover new cultural or paleontological resources during the course of construction. Consequently, construction of the mechanical dry/air cooling or passive draft dry air cooling tower systems could pose a small negative impact.

The fully constructed tower system will be situated in a largely developed area, so there is limited potential for permanent loss of areas with significant cultural or paleontological resources. The same is true for the nearshore intake area, which will undergo some minor modification. The salt deposition and plume impaction from saltwater wet tower operation, however, could accelerate the decay of local surface resources. Collectively, operation of these tower systems could pose a small negative impact.

Visual Resources

Construction of the very tall wet natural draft cooling towers will demand equally high construction equipment (for example, cranes, scaffolding). As the towers get larger during the course of development, the visual impacts will increase and becoming increasingly out of character with the low profile structures in Mesa Complex area. Construction of the towers will pose a moderate negative impact. Construction of the relatively low-profile wet mechanical (forced) draft cooling in this same area will probably not have a significant visual impact during construction and is expected pose a reduced small negative impact. Finally, the somewhat taller hybrid tower may be a relatively prominent feature in Mesa Complex area, an area dominated by lower profile structures. The construction of the hybrid towers can be expected to pose a moderate negative visual impact.

The operating wet natural draft cooling and wet mechanical (forced) draft cooling with its potentially towering unabated plume will be very visually intrusive to the local coastal community. It will be especially intrusive to the nearest public neighbors, the Camp Pendleton "family housing section," located to the northwest of the Mesa Complex. These towers and associated plumes will also represent potential hazards to USMC helicopter training operations that occur near the Mesa Complex. Operation of the wet natural draft cooling and wet mechanical (forced) draft cooling towers will pose a large negative impact. The hybrid cooling tower structure will include plume abatement features, which are expected to largely avoid generating a visible plume, thereby mitigating most of the visual impacts to Camp Pendleton neighbors and reducing its operational impact to a moderate level.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during construction of the wet tower systems. The not inconsequential construction period means that related traffic impacts will not be transitory and the peak workforce may be significant. Access to the construction site is via Basilone Road—a small four-lane road. This road is currently shared by SONGS employees, military personnel, and local park users and prone to congestion at times. Consequently, the transportation-related construction impacts should be considered a moderate negative impact.

Operationally, the wet tower systems will increase maintenance and service requirements, but any related maintenance staff increases are expected to be modest. Operation of the tower system also has the potential to increase the hours of local fogging (and to a lesser extent, icing) on the nearby road systems, which includes an interstate highway. The fogging impacts (from the wet natural draft cooling and wet mechanical (forced) draft cooling towers) could also impact the low altitude USMC helicopter training activities from nearby Camp Pendleton and local boating. The fogging impacts from wet natural draft cooling and wet mechanical (forced) draft cooling tower operation qualify as a moderate negative impact. The hybrid tower system has only very limited potential to increase local fogging and icing conditions, so this system only poses a small negative impact.

Socioeconomic Issues

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

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

The impact to the local housing and land prices is not expected to be very significant in that this is a long-established and well-known industrial area, though addition of the closed-cycle cooling systems may expand the footprint of that industrial area into an area that was previously occupied by office buildings and storage facilities. In addition, most of the nearest housing and land is part of Camp Pendleton, and therefore not available for sale to the public.

Summary

Tables CC-14 through CC-16 summarize the air, water, waste, noise, marine, and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the wet cooling tower systems. With the exception of the visual resource and land use impacts, the construction impacts can be characterized as generally having small negative impact significance in that much of the work will progress on previously developed land or in marine areas that are on, or near, previously disturbed nearshore subaqueous land.

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

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

4.3.2 Once-Through Cooling Intake Options

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 with the construction and operation of the once-through cooling offshore intake system from a broad range of environmental evaluation criteria.

4.3.2.1 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, a systematic approach often used in nuclear licensing renewals was used. Consequently, following discussion of the individual environmental subject areas, the related consequences are categorized as having either positive or negative small, moderate, or large impact significance. The specific criteria for this categorization are shown below.

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

The results of these evaluations and impact categorization are subsequently summarized in Tables DW-2, WW-2, IR-2, IFMS-2, SW-2, CS-2, and VS-2.

Air

The air quality impacts associated with installation of the once-through cooling systems are small, given that the primary construction activities are confined to onshore strips of previously developed land, and marine environments. While some of the options involve onshore demolition work and erection of new structures, in general, offsite fugitive dust impacts will be minimal. Some additional vehicle-related air emissions can be expected from the small number of outage workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment may be necessary for the options requiring more onshore work, and there may be some emission sources on temporary offshore platforms or barges for the deepwater and wedge wire screen systems. Construction supplies, permanent equipment, and piping-related equipment deliveries may be significant in the early phases of construction for the deepwater, offshore wedge wire systems and substrate systems. The overall result is a small negative impact during construction.

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

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

Surface Water

Deepwater intake system construction activities are primarily marine-based and they have the potential to generate significant water quality impacts. Installation of the new 18-foot-diameter pipeline and velocity caps will result in substantial dredging 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. The relocated shoreline system construction activities have the potential to generate significant water quality impacts due to the need to augment the nearshore breakwater system, and associated dredging will result in significant turbidity impacts from disruption of the local seabed—a large negative impact. Construction of the inshore fine screen system and connecting piping will result in localized turbidity impacts from disruption of the local seabed—a moderate negative impact. Placement of the wedge wire modular screens and connecting piping will result in localized turbidity impacts from disruption of the local seabed—a potentially large negative construction impact since cut-and-fill practices are used. Placement of the parallel and connecting piping associated with the substrate system will result in localized turbidity impacts from disruption of the local seabed—a potentially large negative construction impact if cut-and-fill practices are used. Installation via tunneling (a tunnel boring machine) could reduce this condition to a moderate negative impact level. These once-through cooling systems will not change the overall cooling water withdrawal rate or discharge rates.

The related construction efforts of these options may pose some limited land disturbance impacts, especially when onshore structures are added) and related storm water-related impacts.

Given the limited nature of the construction needed to implement operational strategies system or install the variable speed cooling water pump system, no significant additional surface water resources will be needed and there may be little or no new land disturbance or related storm water impacts.

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

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

The once-through cooling intake systems are not expected to require any additional groundwater resources given the primarily offshore construction environment associated with the installation of the once-through cooling intake systems.

Waste

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

The plant loss during storm events from three significant kelp forests in the area has the potential to impact the proposed offshore and nearshore intake systems. SONGS' existing intake system is being impacted during these events, that is, kelp debris is being entrained by the existing SONGS cooling water withdrawal systems or settling on nearby beaches following west and southwesterly wave events (MBC, 2012). This situation will continue to be an issue for the intake relocation (inshore) and inshore fine mesh mechanical systems. Consequently, these systems will continue to demand physical inspection and cleaning processes as part of the maintenance program. Additional biological wastes will likely be generated from implementation of either system. Collection and disposal of these additional marine wastes, therefore, can be categorized a moderate operational negative impact.

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

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

Construction-related waste, including recyclable metals from any related alterations of the previous cooling water pumping system related to implementation of operational strategies could be generated. These wastes are expected to be minor and not represent a burden to offsite disposal facilities. Operation of the operational strategies system could in some cases generate additional marine resource wastes in response to better or more effective screening operations. These wastes are not expected to be appreciable.

Noise

Previous studies have concluded, from consultations with the county of San Diego, 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, offshore wedge wire, in-shore fine screen system, initial intake relocation, and substrate systems are not expected to be significant for public land-based locations, since the primary work areas will be onshore in a somewhat shielded area, near shore in this area, or well offshore. Buffer areas around offshore construction zones will likely be established for safety reasons, but will also serve to reduce noise impacts to offshore noise receptors (watercraft) and shoreline 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.

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

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

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

Land Use

Construction activities associated with the deepwater intake, offshore wedge wire screen, and substrate systems boast onshore or nearshore and offshore components. These activities will likely temporarily preclude normal recreational activities in waters in the associated 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 (during construction) represents a small negative impact for the deepwater and offshore intake option. The substrate filtering option construction impact is somewhat more expansive and so represents a moderate negative impact.

The deepwater intake system or wedge wire 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 negative impact.

Construction activities associated with a variable speed cooling water pump system and operational strategies are largely confined to previously disturbed lands and existing structures. Consequently, there are no changes in land use during construction.

The new variable speed pumping system will reside wholly within existing structures, so there are no permanent changes in land use. The operational strategies (screening, fish deterrents) will also be located in developed areas.

Construction activities associated with this relocated shoreline intake and inshore fine screen system are primarily near or onshore and these activities could temporarily preclude normal recreational activities in waters in the immediate construction areas. As mentioned above, buffer zones will be created and maintained during the course of construction for the safety of the workforce and the public. The potential temporary restriction of normal public access in these marine areas represents a small negative impact for this cooling technology option.

The relocated shoreline intake and inshore fine screen system may represent a change in land use in areas occupied by the previous intake system (which includes some nearshore components) and in previously undeveloped subaqueous areas. The shoreline location of the intake is not expected to impact waterborne traffic. Given these impacts, operation of this underwater system is expected to offer a small-term negative impact.

Marine Ecological Resources

Deepwater intake system and wedge wire construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Significant onshore activities will be involved to erect a new pump house (to support the deepwater intake system), which will have deeper pump forebays. The cut-and-fill process for the installation of the new 13,000-foot-long offshore pipe and velocity caps 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. Installation of the wedge wire modular screens and connecting piping via the cut-and-fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a considerable area of biological productive marine habitat area. Installation of the system using the tunnel boring machine will reduce marine habitat losses and water quality impacts to localized areas around each screen modules.

While the deepwater intake system could be expected to further reduce the impingement impacts typically associated with once-through systems because of its location in deeper and potentially less biological productive area, recent studies (see Section 4.2) indicate that the typical reduction in fish populations that are expected as you move further offshore into deeper water is not seen. The current SONGS once-through system already employs some technologies (offshore velocity cap, angled inshore traveling screens) that currently 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 could serve to reduce entrainment 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 have a limited or no positive impact relative to the current condition.

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

Substrate filtering system construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Development of the new forebay in onshore and nearshore areas will result in significant localized turbidity impacts and temporary and permanent loss of the biological productive nearshore marine habitat area. Installation of the buried piping systems via the cut and fill process will result in significant localized turbidity impacts and the temporary and permanent loss of a considerable area of biological productive marine habitat—a large negative impact. Installation of the system using the tunnel boring machine will reduce marine habitat losses and water quality impacts to localized areas around the screen modules—a moderate negative impact.

This new offshore buried system will certainly reduce the impingement and entrainment impacts associated with SONGS' once-through system. However, because of the existing intake location in deeper, less biologically productive area, the current SONGS once-through system already employs some technologies (offshore velocity cap, angled inshore traveling screens) that serve to reduce these impacts. While the substrate filtering system will not reduce the overall water withdrawal or discharge rates, its ability to reduce intake velocities and filter the influent water will likely satisfy the performance requirements of the *California Once-Through Cooling Policy*. Consequently, this system will, operationally, offer a large positive impact relative to the current condition.

Relocating the shoreline intake system that includes construction of massive breakwater system and nearshore dredging of sea bottom will result in significant localized turbidity impacts and temporary and permanent loss of the biologically productive, nearshore marine habitat area—a significant negative impact.

Operationally, the shoreline intake system will increase the impingement-related cooling system impacts since the benefits derived from the offshore velocity cap are lost. Without improvements in screening, the impingement losses are expected to get worse. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Consequently, the entrainment impacts may be more significant given its new shoreline location, and the thermal discharge impacts to aquatic life will remain unchanged. Collectively, this system will, operationally, offer a negative impact relative to the current condition.

The inshore fine screen system will potentially demand the addition of a new screen house and consequently result in significant localized turbidity impacts and some temporary and permanent loss of the biologically productive nearshore marine habitat area—a moderate negative impact.

Operationally, the inshore fine screen system will reduce the impingement/entrainment-related cooling system impacts, assuming the addition of a new screen house. This system will not, by itself, reduce the overall water withdrawal or discharge rates. However, the system continues to withdraw water from its existing offshore location so entrainment and impingement impacts will be significantly reduced by the fine screen and associated reduced flow through velocity. The thermal discharge impacts to aquatic life will remain largely unchanged. Collectively, this system is expected to offer at least a moderate positive operational impact relative to the current condition.

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

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

Construction activities associated with the variable speed cooling water pump system are confined to the previously developed land areas. There will be little or no construction impacts to marine areas.

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

Terrestrial Ecological Resources

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

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

Cultural and Paleontological Resources

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

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

Transportation

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

Operationally, some of the once-through cooling systems (deepwater intake, wedge wire screen, inshore fine screen system, intake inshore relocation, and substrate filtering intake systems) may increase the maintenance and service requirements of the offshore components and nearshore areas. Consequently, there may be a small negative operational impact from more traffic associated with these activities.

Socioeconomic Issues

While there will be some additional construction-related employment opportunities associated with the installation of these once-through cooling systems, 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, but not result in any related community service or resource concerns.

The impact to the local housing and property is not expected to be significant in that this is a long-established and well-known industrial area, and the nature of the once-through cooling intake systems will not significantly alter that situation. In addition, most of the nearest housing is associated with Camp Pendleton, and therefore not available for sale to the public.

4.3.2.2 Summary

Tables DW-2, WW-2, IR-2, IFMS-2, SWS-2, CS-2, and VS-2 summarize the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the once-through cooling intake options.

The construction impacts for the deepwater intake and offshore wedge wire systems 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. These impacts are not offset by the limited employment opportunities that may be gained during this same period.

Operationally for the deepwater intake system, 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, despite the absence of supporting data, to be less biologically productive. For the offshore wedge wire screen system, there is a moderate positive impact significance related to the further reduction of impingement of the already partially mitigated related impacts. There is no coincident reduction of cooling water withdrawals, so there is no change in thermal discharge impacts for both systems. Overall, the marginal (if any) benefits associated with reductions of impingement and entrainment impacts of the deepwater intake system and similar moderate benefits from the wedge wire system are 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. The construction impacts associated with the intake relocation (inshore) system could be characterized as having moderate negative impact significance in that some of this work may be conducted on previously disturbed subaqueous land. Construction practices will involve significant marine-based work that will generate increased turbidity in the local seawater, could produce a sizeable marine spoils waste, and result in permanent and temporary losses of additional biologically productive nearshore marine habitat. These impacts are not offset by the limited employment opportunities that may be gained during this same period.

Operationally, there are negative impacts related to shifting from the existing offshore velocity cap system to a shoreline intake system due to the expected increase in fish impingement and entrainment, debris handling, and maintenance dredging. The existing velocity cap technology is situated in fairly deep water and is designed to mitigate some of the impingement and entrainment impacts. The shoreline system draws from the normally more biologically rich intertidal and sub-tidal zones. There is no coincident reduction of cooling water withdrawals, so there are no changes in thermal discharge impacts. Collectively, we have identified no positive operational environmental attributes with the shoreline intake system to offset the moderate construction-related negative impact associated with the disruption of additional marine habitats and localized water quality degradation.

With the addition of a new screen house, the construction impacts of the inshore fine mesh screening intake system could be characterized as having moderate negative impact significance in that some of this work may be conducted on previously disturbed subaqueous land. Construction practices will involve marine-based work, which will generate increased turbidity in the local seawater, produce marine spoils waste, and potentially result in permanent and temporary losses of additional biologically productive nearshore marine habitat. These impacts are not offset by the limited employment opportunities that may be gained during this same period.

The new fine screen mesh system continues to use the existing velocity cap that is situated in fairly deep water that currently mitigates some of the impingement and entrainment impacts. The new fine screen system reduces the through screen velocity and adds a fish return system. There is no coincident reduction of cooling water withdrawals, so no change in thermal discharge impacts. Thus, collectively, there are some moderate positive operational environmental attributes with the inshore fine screen system to offset the moderate construction-related negative impact associated with the disruption of additional marine habitats and localized water quality degradation.

The construction impacts associated with the operational strategies (fish deterrent systems) could be characterized as having small negative impact significance, because of the minor increase in construction phase air emissions and wastes. These impacts are not offset by the limited employment opportunities that may be gained during this same period. Operationally, there is a small positive impact significance related to the operational strategies' improved abilities to screen out, retrieve, and return aquatic life to their natural environment. Viewed collectively, the pattern of environmental impact significance ratings suggest that implementation of operational strategies system may offer an overall weak net-positive environmental benefit.

The construction impacts for the substrate filtering system could be characterized as having moderate-to-large negative impact significance, depending on the nature of the installation method (cut and fill versus tunneling). Both construction practices will involve significant marine-based work that will generate increased turbidity in the seawater near construction areas, produce a sizeable marine spoils waste, and result in some 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 is a large positive impact significance related to the substrate filtering systems reduction of the already partially mitigated impingement impacts and its reduction of previously unconstrained entrainment impacts. There is no coincident reduction of cooling water withdrawals, so there is no improvement in thermal discharge impacts. Overall, the operational benefits associated with reductions of impingement and entrainment impacts are largely counterbalanced by the construction-related disruption of the marine habitats and degradation of local water quality. While, the cut and fill construction practices will be more disruptive than the tunneling processes, this option does not collectively offer a definitive overall positive environmental outcome.

The construction impacts associated with the variable speed cooling water pumping system could be characterized as having small negative impact significance, because of the minor increase in construction phase air emissions and wastes. These impacts are not offset by the limited employment opportunities that may be gained during this same period. Operationally, there is a clear, but small, positive impact significance related to the variable speed cooling water pumps' marginal reduction of cooling water withdrawals and the coincident reductions in entrainment and impingement and thermal discharge impacts. Viewed collectively, the pattern of environmental impact significance ratings suggest that the variable speed cooling water pump system is a largely benign technology, which may offer an overall weak net-positive environmental benefit.

4.4 First-of-a-Kind

4.4.1 Closed-Cycle Cooling Systems

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

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

Passive Draft Dry Cooling Towers

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

Mechanical (Forced) Draft Dry Cooling Towers

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

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

Hybrid Wet/Dry Cooling Towers (Circular)

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

Wet Natural Draft Cooling Towers

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

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

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

4.4.2 Deepwater Offshore Intake

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

4.4.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.4.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

This technology is commercially available and can support the large amounts of water withdrawal rates associated with once-through cooling systems with appropriate maintenance provisions. Fine mesh screens have been installed and are operating at Big Bend (0.5 millimeters mesh) and Brayton Point Generating Station (1 millimeter mesh).

The detailed evaluation follows:

- This technology, as modified, does not constitute a first-of-kind to scale. The addition of the new screen house is also not a first-of-kind in scale issue.

- The environmental attributes of fine mesh screens have been extensively studied, and they are operating in large power stations, such as Big Bend and Brayton Point.

- The fish collection and return system typically includes two pressure sprays. The low-pressure spray gently moves egg, larvae, and fish off screen face and fish bucket, and then the follow-on high-pressure spray dislodges the remaining debris clinging to the screen mesh.

4.4.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

This technology is commercially available and can support the high withdrawal flow rate requirements of a once-through cooling system. Although the technology has been applied successfully for a once-through cooling system in a freshwater environment, it is a first-of-a-kind in scale for marine application.

The wedge wire technology is widely used for cooling tower makeup water systems with small flows, but with limited use for intakes requiring large water withdrawals. The largest once-through cooling intake with comparable water withdrawal rates is Elm Road Generating Station in Wisconsin, which withdraws 1.56 million gpm of fresh cooling water from Lake Michigan. The screen slot size for screens in this intake is 9 millimeters, which reduces the clogging potential. No wedge wire screen intake system has been identified for a marine application with water withdrawal rates on the similar order as that required by SONGS.

To lessen the potential for biofouling, screen material for marine application would include the use of copper-nickel alloy.

In summary, wedge wire screen in once-through marine application is a first-of-a-kind to scale. However, through proper maintenance and design, the technology is not considered to have a fatal flaw.

4.4.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.4.7 Source Water Substrate Filtering/Collection Systems

Use of the source water substrate filtering collection system to supply water to a once through cooling system is a first-of-a-kind application of this technology. Previous applications of this technology have been used to supply makeup water to closed cycle cooling systems, which demand a fraction of the amount of water required for once-through cooling.

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

4.4.8 Variable Speed Cooling Water Pumping Systems

This system was not evaluated because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

4.5 Operability General Site Conditions

4.5.1 Closed-Cycle Cooling Systems

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

This study performed for evaluation of closed-cycle cooling water system is based on the existing cooling requirements for circulating water system for SONGS Units 2 and 3. The circulating water system is currently designed to condense exhaust steam from the low-pressure turbines and to dissipate heat loads associated with turbine plant cooling water heat exchangers, saltwater cooling system heat exchangers, and other associated cooling loads. The documents providing technical information obtained from SCE were largely used to develop the basis for the closed-cycle cooling tower design. Where possible, the questionable values and/or clarifications were verified and/or confirmed by SCE.

Although most of current seawater entering the intake structure is pumped through the main condenser via circulating water system, a smaller portion of intake seawater flows into saltwater cooling system pumps. The saltwater cooling system provides the ultimate heat sink for the nuclear safety-related component cooling system. Redundancy is provided by two independent trains of saltwater cooling system for each unit at SONGS. Each train is designed to provide 100 percent of design heat transfer requirement capacity, using one of two pumps in each train. This ultimate heat sink is capable of providing adequate cooling water to shut down and cool down both units or to mitigate the consequences of an accident in one unit and shut down and cool down the other unit (System Description, 2004). Due to the safety-related requirements of the saltwater cooling system, the conceptual design of the closed-cycle cooling system for SONGS will not include modifying the existing saltwater cooling system and the closed-cycle cooling system described in this study will not be safety-related equipment. In the event of a failure in the closed-cycle cooling system, the plant will be able to achieve the safe shutdown under its current safety design features.

The design heat duty and circulating water flows for the conversion of SONGS Units 2 and 3 once-through cooling systems are summarized in the table below. The information was obtained from the system descriptions for the circulating water system, turbine plant cooling water system, and saltwater cooling system.

Design Heat Load and Flow Rates – SONGS Units 2 and 3

		Current Once-Through Cooling System	Closed-Cycle Cooling System
Main Condenser, each unit	MMBtu/hr	7,950	7,950
Turbine Plant Cooling Water Heat Exchangers, each unit	MMBtu/hr	114	114
Saltwater Cooling System Heat Exchangers, each unit	MMBtu/hr	177	0
Total Heat Load, each unit	MMBtu/hr	8,241	8,064**
Temperature Rise in Main Condenser, each unit	F	19	19
Circulation Water Flow, each unit	gpm	860,000	848,842

** Heat duty includes turbine plant cooling water heat exchangers, but does not include saltwater cooling system duty, because this safety-related system will not be serviced by the closed-cycle cooling towers.

Site Ambient Conditions at SONGS

SONGS is in San Diego County, approximately 2.5 miles south of San Clemente. The design ambient temperatures (dry and wet bulb) used for the development of overall cooling tower design are based on the 0.4 percent exceedance temperatures as obtained from Engineering Weather Data for San Clemente, California.

Design dry bulb temperature:	79°F
Design wet bulb temperature:	70°F
Plume free design point (dry bulb) Relative Humidity, RH):	33°F /90% RH

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

Plant Performance

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

Due to physical area constraints at the SONGS site, conceptual design of cooling towers is focused on limiting the physical size of the tower. The vendors have designed the passive draft dry/air and mechanical (forced) draft dry/air cooling towers based on approach of 20°F to design dry bulb temperature, while for wet natural draft and wet mechanical (forced) draft, including hybrid wet/dry (hybrid) cooling towers with approach of 12°F and 8°F, respectively, to wet bulb temperature. These approaches were developed based on iterative investigations with closed-cycle cooling technology suppliers. The cooling towers with these approach temperatures result in cold water temperatures exceeding the existing design maximum allowable temperatures for some of the closed cooling water system components. This may impact the design and operation of closed cooling water system components and will be evaluated further during Phase 2.

The estimated condenser pressure, steam turbine gross output change, and parasitic loads were developed using SCE heat balances and the Alstom Turbine Generator correction curve provided by SCE and are summarized as follows:

Operational Impacts per Unit

Design	Current – Once-Through Cooling System	Passive Draft/Dry Air Cooling	Mechanical (Forced) Draft Dry Air Cooling	Hybrid Wet/Dry Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling
Cooling water inlet temperature to tower, °F	-	118	118	97	101	97
Cooling water outlet temperature from tower, °F		99	99	78	82	78
Condenser cleanliness factor, %		85	85	85	85	85
Condenser pressure, in HgA	1.99/2.55 (Note 1)	4.2/5.2	4.2/5.2	2.43/3.09	3.16/4.02	2.43/3.09
Steam turbine output change, %	Base (Note 2)	-6.7	-6.7	-1.2	-3.3	-1.2
Steam turbine output change, MW	Base (Note 2)	-81.9	-81.9	-14.2	-40.7	-14.2
Tower fans auxiliary load, MW	Base	0	32.6	23.8	0	14.4
Circulating water pumps auxiliary load change (Note 3), MW	Base	19.5	19.5	14.5	14.5	14.5

Notes:

1. Base steam turbine backpressure from SCE heat balance Units 2 and 3, 100 percent reactor power-VWO.

2. The base steam turbine output: 1,217,892 kWe.

3. Additional circulating water pump load changes represent the difference between the new circulating water pumps for the closed-cycle cooling towers and existing circulating water pumps for once-through cooling system. It does not reflect any auxiliary load changes to other circulating water systems and/or closed component cooling systems

* * *

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

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

Low-Pressure Turbine Exhaust Pressure

Due to the higher cold water temperatures associated with each closed-cycle cooling technology compared to the existing once-through cooling system, the condenser pressures will be higher and the power produced by plant will be less. The condenser pressure is expected to be in the range of approximately 4.2 to 5.2 inches HgA for the dry/air closed-loop cooling systems, while it is approximately 2.4 to 4.1 inches HgA for wet closed-loop cooling systems at the ambient design dry bulb/wet bulb temperatures. The differences in pressure are due to the fact that each technology achieves a different cold water temperature at the design ambient conditions. These pressures will place the low-pressure turbine operation in Zone D (Reference: General Diagram-Turbine LP Exhaust Pressure Operational Limits for SONGS Units 2 & 3, 30000, Rev. 3 dated 08/27/2007) where above 45 percent plant load, pre-trip alarm will not occur at the condenser pressure below 6.0 inches HgA. The *Turbine LP Exhaust Pressure Operational Limits* diagram states that continuous operation in this zone is not recommended, but there is no specific time limit. The turbine manufacturer has been consulted regarding the possibility of operating the turbine at SONGS at higher back-pressures (back-pressures in Zone D). They indicated that the current turbine design will not allow for continuous operation in this zone. However, they also indicated it might be possible with major turbine modifications such as a change out of the entire low-pressure rotors. Operation at higher back-pressures resulting from use of dry cooling is therefore technically feasible, but the commercial impact of a detailed undertaking such as this turbine modification will be evaluated in Phase 2.

As the low-pressure turbine exhaust pressure increases, the annulus velocity decreases resulting in higher leaving losses and potentially heating up the last stage blades. Additionally, a higher exhaust pressure could produce vortex action that may result in water erosion at the root on the discharge side of last stage rotating blades. The low-pressure turbine is normally designed with not-to-exceed exhaust pressure based on the last stage blade size and load operation (steam/moisture flow rates) so that annulus velocity does not fall below a specific limit. The manufacturers normally develop the low-pressure turbine exhaust pressure performance curve, limits, and alarms to protect the last stage blades from potential damage.

Reduction in Power Generation

Because of the higher condenser pressure associated with the closed-cycle cooling, the power output of the plant will be lower than the current output with once-through cooling. The reduction in plant power generation is expected to be approximately 6.7 percent for dry/air (passive draft and mechanical draft dry air cooling) cooling systems and in the range of 1.2 percent to 3.3 percent for the wet (natural draft, mechanical draft, and hybrid) cooling systems and additional parasitic loads required by the closed-cycle cooling systems.

Potential Modifications to Main Condenser and Other Cooling Components

Location of the towers on the Mesa places them significantly above the elevation of the main condenser. While this is not a first-of-a-kind condition, it is unusual. The elevation difference causes an increase in condenser operating pressure. Locating the circulating water pumps on the outlet side of the condenser reduces the inlet pressure. With this arrangement at SONGS, the resulting condenser inlet pressure is approximately 80 to 85 feet, assuming 15 to 20 feet of line losses. This is approximately two times the current 40 feet of inlet pressure. For a wet tower, the circulating water from the basins will flow by gravity to and through the condenser, and the circulating water pumps will pump it back to the tower and into the tower risers. The auxiliary power required for the pumps is approximately the same as if they were located at the tower basin.

The budgetary quotes and physical sizing of closed-loop cooling towers obtained from vendors are based on the existing thermal loads on the main condenser and other associated cooling components. However, some potential modifications to the main condenser may be required due to higher circulating water pressure resulting from the higher elevation of the cooling tower. Other associated cooling components may also require modifications due to potentially exceeding maximum allowable temperature of cold water temperature resulting from higher ambient conditions and cooling tower design and practically achievable approach temperatures.

The closed-cycle cooling systems will be designed to supply circulating water with flows, pressures, and temperatures as close as possible to existing conditions at SONGS. Since the cooling water tower design is normally based on the approach temperatures to ambient conditions, the cold water temperatures from the cooling tower design will be higher compared to existing conditions. Similarly, the cold water pressures will also be relatively higher due to cooling tower elevation. As a result of this, the changes to the pumps, valves, and other cooling components operation, if any, that may occur will be evaluated in detail during Phase 2.

Condenser Operation

With the cooling tower located at significantly higher ground than the condenser and the in-line circulating water pumps station downstream of the condenser, the discharge flow from the tower basin to the condenser is via gravity and the circulating water pumps will act as booster pumps to return condenser discharge flow to the cooling towers. Operationally, the circulating water system resembles a *U*-loop with the condenser and the circulating water pumps station at the bottom of the loop. The circulating water pump station could be located at the parking lot closer to the turbine buildings, subject to finalization during Phase 2. Each unit will have its own pump station consisting of four 25 percent pumps.

Initial filling of the circulating water lines and the condenser/waterboxes will be from the cooling tower basin. The process will be controlled so that the air within the system piping and condenser waterboxes can be vented via various high point vent valves. Once the system piping and condenser are flooded, they will remain full until the system piping is drained for maintenance or repairs. Once the system is filled, the circulating water pumps can be started, one at a time. System shutdown should involve simply closing the pump discharge valve and shutting down the pumps. Typically, the only components needing draining for service would be condenser waterboxes or the circulating water pumps, which can be isolated via inlet/suction and outlet/discharge isolation valves. The condenser/waterboxes would be drained either to a holding tank or overboard. Refilling would involve returning the water from the holding tank, or if the drained volume was overboarded, gradually opening either the inlet or discharge condenser isolation valves concurrent with venting. Given the volume of water involved and the size of the lines, it would be appropriate to consider redundant isolation valves on the inlet and discharge sides of the condenser for safety, reliability, and maintenance purposes. In the event of power failure and tripping of all circulating water pumps, with piping full of water (both on the supply piping to the condenser and discharge piping from condenser/circulating water pumps), water will circulate to the cooling tower until inertial effects are diminished.

Availability of Freshwater Sources

The water for use in the closed-cycle cooling systems could be supplied by fresh or reclaimed water from nearby water treatment facilities.

Groundwater is not an option at SONGS. USMC policy requires the maintenance of a seaward gradient of the groundwater table at all times to prevent intrusion of saline water into freshwater aquifers. This policy prohibits the withdrawal of considerable amounts of groundwater stored in alluvium below or near sea level. Past groundwater withdrawals have fully used the basins potential up to the policy limits. Future groundwater usage from the San Onofre Basin is expected to remain the same as past usage with no projected changes (SONGS, May 2007). This is interpreted to indicate that freshwater groundwater is not available.

Based on preliminary discussions with municipality representatives, there may be a total of up to 53 mgd of fresh or reclaimed water that would come from water treatment facilities within 20 miles of the site, including La Salina Waste Water Treatment Plant in Oceanside, San Clemente Water Reclamation Facility, Aliso Creek Outfall, and the Southern Orange County San Juan Ocean Outfall. Quantities available from each will be confirmed during Phase 2. Conceptual development of the pipelines and pumping stations required to deliver this water from the sources to the plant site will be included in the Phase 2 analysis.

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

4.5.2 Deepwater Offshore Intake

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

4.5.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.5.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

As described in Section 4.2.4, a new screen house structure should be installed adjacent to the existing intake that can accommodate more traveling water fine mesh screens, with reduced approach and through screen velocities. The screens will come with fish collection and return system and will be continuously operating. This new screen house structure would be connected to the existing offshore suction line close to the existing pump intake, through intake piping rerouting, as shown in Figure IFMS-1.

Since a new screen house is installed to accommodate more traveling water screens, the existing intake pump house will remain functional without change, including seawater supply pumps in the existing intake can remain where they are. Traveling water screens and fish lift in the existing pump intake can be removed once the new screen house is operational. During the intake pipe rerouting, it is necessary to perform the work on a per unit basis, so that the unit that is operational can continuous supply safety-related seawater cooling pumps continuously for both units.

Continuously operated traveling water screens will increase the maintenance and other necessary service to these screens, when compared to the existing, intermittently operated screens.

4.5.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The wedge wire screen technology can be integrated into the existing system with modifications occurring primarily at an offshore location, as shown on Figures WW-1 through WW-3. There are no changes to the onshore pump intake structure equipment. The existing traveling screens and fish removal system need to remain functional, since they need to filter out the debris and remove fish for the flow coming in through the existing auxiliary offshore intake system, which is the smaller velocity cap intake located approximately 92 feet shoreward from the main velocity caps (primary offshore intake system). The main velocity cap intakes will be capped.

The detailed evaluation for this technology is as follows:

- The offshore screen/piping design will be based on maintaining the current intake system pressure loss considering the wedge wire screens piping losses in lieu of the drop across the combination of velocity cap and traveling screens, so that there is an adequate depth of water for the submergence at circulating water pumps suction.

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

- The wedge wire screen technology is applicable to SONGS depending on the slot size and specific site aquatic life condition.
- Small size wedge screens are susceptible to clogging that impedes the cooling water withdrawals. Therefore, it is paramount that periodic inspections and maintenance be regularly performed.
- The smaller the slot size, the higher the frequency of clogging and, therefore, the greater the number of screens and associated maintenance required.
- Complete stoppage of the flow may result in vacuum conditions inside the screen drums that can result in screen damage, which is a design perimeter that is considered in the screen design.
- Frequent inspection and cleaning of screens, using hydraulic jets from service vessels assisted by divers, is an essential maintenance activity for these offshore screens. The frequency of inspection and diver-assisted cleaning are directly proportional to the seasonal marine growth and debris condition at the screen location. These activities are likely to be pursued from two to four times a year.

In summary, wedge wire screen can be integrated into the existing intake system as long as the maintenance program for the screens is fully implemented and there are no fatal flaws in the operation of the modified intake system equipped with wedge wire screens.

4.5.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.5.7 Source Water Substrate Filtering/Collection Systems

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

- The source water substrate filtering collection system components will be corrosion resistant to the marine environment.
- The imported materials used in the system—artificial filter, crushed stone, and armor rock—will be free of deleterious material and essentially nonreactive in the marine environment.
- Periodic bottom surveys will be needed to assess substrate conditions. Significant build-up of vegetation or fine materials (silts or clays) on the bottom could likely interfere with the efficient operation of the system, that is, the clogging of laterals.

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

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

In summary, although manual cleaning of a vast number of laterals off clogging is possible in theory, it is not practical for a once-through cooling system application such as SONGS. All the envelop design parameters given in Section 3 are based on a 100 percent efficiency, which cannot be maintained following a plant operation. Exactly how much design margin is needed to maintain a given design efficiency cannot be known nor accurately predicted. This will result in a generally less reliable intake system, as compared to other traditional intake systems. Therefore, from an operational point of view, this technology is considered a fatal flaw, when it is applied to a once-through cooling system such as SONGS.

4.5.8 Variable Speed Cooling Water Pumping Systems

Not evaluated or no need to evaluate because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

4.6 Seismic and Tsunami Issues

4.6.1 Closed-Cycle Cooling Systems

SONGS is located on the southern California coast, near San Clemente. It is situated on the coastal plain at the base of the western foothills of the Santa Margarita Mountain Range. A seawall, the top elevation of which is at elevation 30 feet, is in place between the Pacific Ocean and the plant to afford wave protection (NUREG, 1981).

The calculated maximum tsunami run-up is 27.5 feet above mean lower low water due to a 6-foot storm wave occurring during the design still water level of 15.6 feet mean lower low water. This is 2.5 feet below the top of the seawall (NUREG, 1981).

The design still water event is the result of combined 10 percent exceedance spring high tide (7.0 feet), storm surge (2.0 feet), sea level anomaly (0.33 feet), and a maximum tsunami run-up (6.27 feet) from a locally generated tsunami. Distant tsunami generators (subterranean earthquakes, submarine landslides, etc.) are less severe than the locally generated tsunami (NUREG, 1981).

All of the closed-cycle technology applications being considered for SONGS would be constructed in an area of the plant that is inland from the plant site, across the interstate highway, and well above the maximum tsunami wave run-up.

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

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

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

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

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

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

At approximately 114 feet high, the cooling towers for mechanical forced draft dry air towers have the lowest height profile, which is very desirable from seismic/structural design standpoint. At approximately 125 feet high, the wet mechanical (forced) draft cooling towers will also be relatively short and desirable from a seismic/structural standpoint.

Summary

All cooling technologies are considered viable from a tsunami, seismic, and structural perspective. However, from an efficient design and construction perspective, the mechanical forced draft dry air tower is considered most attractive for SONGS. The hybrid wet/dry cooling tower option is also considered to be an efficient option, and warrants further consideration when making the final selection.

4.6.2 Deepwater Offshore Intake

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

4.6.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.6.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

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

The traveling screen structural design and fish return piping will use the current licensing base seismic category that was employed for the current onshore pump intake. The new screen house can be located on/nearshore and be designed with proper grade level to avoid wave damage.

4.6.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

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

The detailed evaluation for this section is as follows:

- The structural design will use the same seismic category that was used for velocity cap design.
- This technology is submerged and located offshore and will be designed to withstand design wave forces.

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

4.6.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.6.7 Source Water Substrate Filtering/Collection Systems

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

- The structural design will use the same seismic category that was used for the current shoreline intake.
- The offshore substrate system will be designed to withstand design wave forces.

4.6.8 Variable Speed Cooling Water Pumping Systems

Not evaluated or no need to evaluate because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

4.7 Structural

4.7.1 Closed-Cycle Cooling Systems

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

Structural considerations are included in the *Seismic and Tsunami* discussion in Section 4.6.

4.7.2 Deepwater Offshore Intake

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

4.7.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.7.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

A new screen house is proposed and its connection to the existing intake suction line will be fully reviewed regarding structural aspects in subsequent assessment phase. At this phase of assessment, there is no evidence that the existing intake piping integrity will be adversely impacted by the intake pipeline rerouting to the new screen house.

4.7.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

The offshore wedge wire screen system can be properly designed to withstand all design loadings that may be encountered in the open sea environment. This design will consider full collapsing pressure to the outer screen that may be encountered during a debris blockage event. The impact on existing structures consists of adding new pipe branches to the offshore buried 18-foot diameter pipe.

A detailed structure evaluation regarding on the addition of the offshore wedge wire screen system to the existing offshore intake pipe will be performed in the Phase 2 part of the study. At this phase of the assessment, there is little evidence that the existing structure integrity of the offshore intake piping system will be adversely impacted by the addition of the wedge wire screen system, as the construction activity for the tie-in of a new piping branch to the existing 18-foot-diameter pipe will be fully and carefully planned and designed to avoid structural concern.

4.7.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.7.7 Source Water Substrate Filtering/Collection Systems

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

The offshore substrate filtering collection system is an independent system delivering the cooling water via a large conduit and does not interfere with the shoreline pump intake structure.

4.7.8 Variable Speed Cooling Water Pumping Systems

Not evaluated or no need to evaluate because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

4.8 Construction

4.8.1 Closed-Cycle Cooling Systems

The closed cooling systems for SONGS 2 & 3 are considered feasibly constructible based on current day construction methods, practice, and knowledge. However, all of the systems will have their own challenging issues and degree of difficulty.

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

- Perform closed-cycle cooling system work activities
- Conduct mobilization/install temporary facilities/utilities, and provide training
- Install temporary environmental controls
- Excavate and grade tower areas
- Excavate pump house/water treatment areas
- Excavate underground piping, ducts, and electrical bank areas
- Install grounding
- Install piling/foundations/slabs/basins (towers/pump houses/electrical building)
- Install underground ducts/electrical duct bank and underground piping/valves
- Install backfill
- Install structures (towers/pump houses/electrical buildings)
- Install pumps/motors/mechanical equipment/duct/HVAC
- Install ground piping, valves, hangers, and supports

- Install electrical equipment (motor control centers/switchgear/transformers)
- Install aboveground conduit and cable tray
- Install power and control cable/terminations
- Install lighting, and aviation lighting/lightening protection
- Perform control room modifications
- Conduct startup testing
- Perform replacement system tie-ins and decommissioning modifications to existing equipment that will no longer be needed.
- Perform commissioning
- Clean up and demobilize

The closed-cycle cooling technology options for SONGS will require tunneling under the I-5 San Diego Freeway and the Old Pacific Highway. While it may be difficult and challenging, it is feasible to perform sleeve jacking, directional drilling, and tunnel boring technologies to accomplish the task of installing the circulating water duct/pipe under the I-5 and Old Pacific Highway.

- Use of passive draft dry technology will require three towers per unit for a total of six towers, all of which will not fit on the currently leased Mesa site area. Either some of the towers or some of the existing facilities will need to be placed outside the Mesa area, requiring clearing, excavation, and grading. Complete construction of the passive draft air cooling towers is estimated to take approximately 6 years using a peak workforce of 500.

- Mechanical forced draft dry technology will require one mechanical (forced) draft dry/air cooling tower per unit for a total of two towers, both of which will fit on the currently leased Mesa site area. This option will require considerable demolition to remove current structures from the required cooling tower footprint. The excavation quantity and construction times will be developed during Phase 2 of this study but based on a preliminary review, complete construction of the mechanical draft dry/air cooling towers for both units is estimated to take approximately 6 years using a peak workforce of 500.

- The hybrid, natural draft wet, and mechanical (forced) draft wet technologies will require two towers per unit for a total of four towers. The footprint of the four towers will fit on the currently leased Mesa site area. This option will require some clearing and grading, but demolition of the current structures on the Mesa would not be required. The excavation quantity and construction times will be developed during Phase 2 of this study but based on a review preliminary estimate is that complete construction of any of the wet technologies for both units is estimated to take approximately 6 years using a peak workforce of 500.

4.8.2 Deepwater Offshore Intake

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

4.8.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.8.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

A new screen house should be built as described in Section 4.2.4. The detailed construction evaluation will be addressed in a subsequent assessment phase. Major construction activities using this technology include:

- Excavate and build a coffer dam for the new screen house.
- Construct new screen houses, one per unit, while the plants are in operation.
- Install rerouted piping, both supply piping to and return piping from the new screen house, just to the tie in location.
- Isolate one unit, and install piping tied in with the offshore intake piping conduit.
- Repeat for the second unit, for the piping tied in with the offshore intake piping conduit.

With the addition of a new screen house, extensive unit downtime will be needed to support the pipe rerouting and tie-in with the existing intake suction line. The details of this effort will be laid out during the next phase of this study.

4.8.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

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

- Construct wedge wire assemblies piping manifolds onshore.
- Excavate and install a new 18-foot-diameter branch joint on existing 18-foot-diameter offshore pipe.
- Dredge the seabed for placement of wedge wire assembly manifolds.
- Install the wedge wire piping manifolds and placement of backfill material and seabed riprap and armor protection. A gap for a spool piece between screen manifold and new 18-foot branch line should be allocated.
- Install wedge wire screens on manifolds at the sea bottom.
- Connect wedge wire main manifold to new 18-foot-diameter junction using spool piece.
- Block inlets to offshore velocity cap.

The wedge wire screen pipe manifold assemblies will be built on shore, launched from the surface of a barge, and floated to their design location. The wedge wire assembly manifold and the new 18-foot-diameter branch will be buried with adequate cover. Before the installation of the wedge wire assembly manifold, the seabed will be dredged/excavated approximately 15 to 18 feet deep to bury the manifolds. Similarly, for the new 18-foot-diameter branch line, the seabed will be dredged/excavated 22 to 25 feet deep. Turbidity curtains may be required to minimize the suspended solids that reach the velocity cap.

Upon completion of the manifold and new branch line burial, the seabed will be leveled with graded crushed stone and protected with riprap and armor stone on the top layer for stability and scour protection. Although the installation process will be a challenge, there is no reason to conclude that these efforts will not be successful.

4.8.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.8.7 Source Water Substrate Filtering/Collection Systems

Major construction activities for using this technology will include the following:

- Dredge/excavate the seabed for placement of laterals and manifold lines.
- Install the offshore laterals. Installation consists of placing laterals in the excavated trench and covering with backfill material (either excavated substrate or artificial filter), crushed stone, and armor stone.
- Install the pump forebay at the confluence of the manifold lines.
- Turbidity curtains may be required to control suspended solids.
- Upon completion of the laterals and manifold, the seabed will be leveled with graded crushed stone and protected with riprap and topped by armor stone for stability and scour protection.

4.8.8 Variable Speed Cooling Water Pumping Systems

Not evaluated or no need to evaluate because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

4.9 Maintenance

4.9.1 Closed-Cycle Cooling Systems

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

Additional equipment could be purchased to help reduce jobhours required to perform gearbox lubrication oil change-out and reduce the volume of hazardous waste disposal of used oil. These include oil filtration systems and their purchase and use is at the discretion of SONGS personnel.

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

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Check condition of finned-tube heat exchangers	Quarterly	✓	✓			✓
Clean fins on heat exchanger tube bundles	Semiannually or as needed	✓	✓			✓
Operate ball cleaning system for tube internal surfaces	Semiannually or as needed	✓	✓			✓
Check for and repair/replace missing or broken water distribution pipes or nozzles	Monthly	✓	✓	✓	✓	✓
Weigh fill packs to characterize fouling	Annually			✓	✓	✓
Check for and repair/replace missing or broken fill packs	Quarterly			✓	✓	✓
Check for and repair/replace missing or broken drift eliminator packs	Quarterly			✓	✓	✓
Check for and repair/replace missing or broken drift eliminator seals	Quarterly			✓	✓	✓

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Check oil level in gear box	Daily		✓		✓	✓
Check for foreign material in gear box oil	Every 2 weeks		✓		✓	✓
Replace oil in gear box	Semiannually		✓		✓	✓
Check backlash and endplay of gear box shafts	Semiannually		✓		✓	✓
Ensure that no buildup or other deposits are present on exterior surface of gear box (any inhibitors of proper cooling)	Semiannually		✓		✓	✓
Inspect gear box gears for wear and corrosion	Semiannually		✓		✓	✓
Check and adjust alignment of driveshaft	Semiannually		✓		✓	✓
Check and adjust fan pitch angles	Quarterly		✓		✓	✓
Check and adjust fan blade tracking	Quarterly		✓		✓	✓
Check and adjust fan blade tip clearance	Quarterly		✓		✓	✓
Check tightness of fan bolts	Quarterly		✓		✓	✓
Ensure fan weepholes are clear	Quarterly		✓		✓	✓
Check tightness of structural connecting bolts	Annually	✓	✓	✓	✓	✓
Check for and replace any fan blade wear or defects	Quarterly		✓		✓	✓
Check operating mechanical equipment for excessive noise	Daily		✓		✓	✓
Check vibration levels of operating mechanical equipment	Daily		✓		✓	✓
Check condition and repair if necessary – concrete shell	Annually	✓		✓		
Check proper attachment and condition of the airseal	Annually			✓		
Check condition of protective epoxy coating/sheeting – steel shell	Annually			✓		
Check for scale, algae, etc. to ensure that water treatment is adequate	Weekly			✓	✓	✓
Check cold water basin level	Daily			✓	✓	✓
Inspect cold water basin and repair any cracks or coating defects as necessary	Semiannually			✓	✓	✓

Activity	Recommended Frequency (Tower Supplier Should be Consulted to Develop Formal Program for the Selected Technology)	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Relubricate motor bearings	Semiannually		✓		✓	✓
Ensure that no buildup or other deposits are present on exterior surface of motor (any inhibitors of proper motor cooling)	Semiannually		✓		✓	✓
Check proper operation of valves	Monthly	✓	✓	✓	✓	✓
Lubricate valves	Quarterly	✓	✓	✓	✓	✓
Check proper operation of dampers	Monthly					✓
Check condition of flanged and threaded connections and replace gaskets as necessary	Monthly	✓	✓	✓	✓	✓
Check steel structures for evidence of corrosion	Annually	✓	✓	✓	✓	✓
Check function of and replace bulbs as necessary – aircraft warning lights on top of shell	Daily	✓		✓		

4.9.2 Deepwater Offshore Intake

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

4.9.3 Initial Intake Relocation

This criterion has not been evaluated because this technology has been determined to be technically unacceptable in Section 4.2 for this application.

4.9.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

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

4.9.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

There are considerably greater operation and maintenance efforts associated with the use of offshore wedge wire screens, as compared to the existing offshore velocity cap operation and maintenance. The major concern will be controlling marine biofouling.

The detailed evaluation will be as follows:

- While narrow-slot wedge wire screens are effective at preventing marine life from entering the pipeline, they are also susceptible to clogging from floating debris.
- Due to distance, size, and number of screens from the shoreline, the use of air backwash system is not practical and screen design should consider this aspect of design.
- The minimum slot size has been initially set at 6 millimeters. The final sizing will be subject to further evaluation and in-situ testing with 2-millimeter and 6-millimeter slot openings, considering site-specific marine life impacts.
- Frequent inspection and cleaning of screens using hydraulic jets from service vessels assisted by divers is an essential part of the maintenance program. The frequency of inspection and diver-assisted cleaning is directly proportional to the seasonal marine growth and debris conditions at the screen location. These activities will likely be pursued two to four times a year. This frequency will need to be verified by trending the condition of the screens after they are placed in operation.
- At SONGS, there is an existing thermal shock treatment system that can be applied to both the intake and discharge lines. This system may be used to clean screen intake surfaces.

4.9.6 Operational Strategies to Reduce Impingement and Entrainment

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

4.9.7 Source Water Substrate Filtering/Collection Systems

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

- Periodic dredging may be required if a build-up of fine materials or organic debris is observed on the substrate.
- Periodic undersea video inspections of laterals will be needed to detect encrustation or plugging of lateral openings.
- Cleaning of laterals using water jet or brush techniques will be performed if encrustation or plugging is observed. For a large field of laterals this may not be practical.
- Limitations of a laterals inspection, maintenance, and cleaning program can result in degradation of the lateral systems and eventual flow reduction to the receiving manifolds, maybe even flow stoppage.

It is noted again that the substrate filtering system only supplies cooling water to the circulating water system and, for the licensing basis, the existing auxiliary offshore intake system will remain intact supplying 34,000 gpm flow to the safety-related saltwater cooling pumps for both units.

4.9.8 Variable Speed Cooling Water Pumping Systems

Not evaluated or no need to evaluate because this technology has been deemed unacceptable in Section 4.2, a critical Set A criterion.

5. Conclusion

5.1 Closed-Cycle Cooling Systems

Replacing the SONGS' once-through cooling systems with any of the five variants of closed cycle cooling technology evaluated is technically feasible. These five variants will thus likely be viewed as complying with the *California Once-Through Cooling Policy* requirements on impingement and entrainment reduction because those reductions are considered equivalent to reductions in intake flow rate.

Using closed cycle technology for all of the existing once-through cooling systems—except for safety-related systems and components—results in dramatic reduction of cooling water withdrawals from the Pacific Ocean.

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

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

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

	Passive Draft Dry/Air Cooling	Mechanical (Forced) Draft Dry/Air Cooling	Wet Natural Draft Cooling	Wet Mechanical (Forced) Draft Cooling	Hybrid Wet/Dry Cooling
Estimated Decrease in Turbine Output per Unit, MW	81.9	81.9	40.7	14.2	14.2
Estimated Total Plot Area Requirement for Both Units, ft²	6.4 million	2.8 million	1.2 million	1.8 million	1.8 million
Visible Plume	No	No	Yes	Yes	No
Associated Air Emissions	No	No	Yes	Yes	Yes
Construction of circulating water piping under I-5 and Old Coast Hwy	Yes	Yes	Yes	Yes	Yes
Required Parasitic Loads per Unit (includes fan power and increased circulating water pump power), MW	19.5	52.1	14.5	28.9	38.3
Contentious Permitting process	Yes	Yes	Yes	Yes	Yes

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

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

5.2 Deepwater Offshore Intake

As described in detail in Section 4.2.2, there is no advantage to relocating the offshore intake to a 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. Extending the offshore pipeline to even deeper depths, such as 200 or 250 feet, is not practical. Major challenges are likely with regard to 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 relocating to a deeper intake site alone, compared to the wedge wire technology alternative that is closer to the shoreline. While impingement reduction rule can be satisfied, there is no clear advantage over wedge wire screens entrainment reduction. When considering the environmental impacts from the associated significant disturbance to the local marine environment, relocating 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.

5.3 Initial Intake Relocation

Because the shoreline intake technology is less effective in mitigating fish entrainment impacts when compared to the existing offshore velocity cap system technology, this technology should not be considered for further evaluation. Additionally, there is no data to support that abandoning the current offshore intake and installing an onshore intake at SONGS will provide any improvements in fish entrainment and impingement compared to the existing offshore velocity cap system. Furthermore, since the new shoreline intake will need to take in cooling water for the safety-related saltwater pumps, it can be a fatal flaw for this approach since the new shoreline intake basin will not provide sufficient suction for the saltwater cooling pumps during the drawdown expected for a tsunami.

5.4 Inshore Mechanical (Active) Intake Fine Mesh Screening Systems

Retrofitting the existing pump intake by replacing the flow-through screen panel with fine mesh panels (1 millimeter x 4 millimeters or 2 millimeters x 6 millimeters) and adding a fish collection/return system can reduce the entrainment impact, and it represents an improvement over the existing condition. Eggs/larvae and fish trapped on fine mesh will be collected and returned back to the sea via a new fish return pipeline. However, the fundamental risk associated with adding the fine screen panel is screen rupture during heavy debris seasons. This situation has occurred on similar systems that have reduced their screen mesh panel opening to 2 millimeters. This risk could be characterized as a fatal flaw, if the fine screen system is installed in the existing cooling water intake structure.

To fully gain the intended benefits of this technology, a new screen house will have to be added near the existing pump intake, which will allow more screens to be put in service to reduce the approach and flow through screen velocities. The number of screens can be increased to reduce the through mesh flow velocity to 0.5 fps. The individual fish collection and return system improves the survival of egg/larvae and fish impinged on the screens.

Thus, on the basis of the criteria evaluation in Section 4, this fine mesh technology should be a candidate for further evaluation in the pending Phase 2 assessment, when paired with a new screen house. Detailed design and inter-connecting piping between the new screen house and the existing intake suction line and the existing pump house will be pursued in a subsequent assessment phase.

5.5 Offshore Modular Wedge Wire or Similar Exclusion Screening Systems

Modifying the existing offshore intake system by capping the offshore velocity cap intake head and attaching a new set of manifolds with multiple arrays of wedge wire screen modules to the existing 18-foot-diameter suction pipe is technically feasible and will likely be viewed as complying with the *California Once-Through Cooling Policy,* requirements on the impingement reduction, since the screen thru-slot velocity will be less than 0.5 fps. Minimization of juvenile fish and fish larvae impingement on the screen and reduction of entrainment of fish egg and larvae associated with the wedge wire screens with a slot size of 6 millimeters, compared to the existing velocity cap intake system with high inlet velocity and no offshore screening, will offer benefits despite the fact that the cooling water withdrawal rate remains unchanged. Given uncertain screen slot size performance attributes, it will be necessary for SONGS to conduct further studies including in-situ testing using two different slot size screens (that is, 2-millimeter and 6-millimeter slots) and marine monitoring to assess the magnitude of these impingement and entrainment benefits and to evaluate their compliance with *California Once-Through Cooling Policy* requirements. It should be noted that the number of screens required for the SONGS once-through cooling capacity will increase significantly with reducing screen slot size, for example, number of screens required for the 2-millimeter slot size will be approximately twice that for the 6-millimeter slot size.

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

5.6 Operational Strategies to Reduce Impingement and Entrainment

As described in Section 4.2.6, the available operational strategies to reduce impingement and entrainment impacts in the existing SONGS cooling water system are very limited and their use alone would not reduce entrainment or impingement mortality (a Set A criterion) at the SONGS intake to a level commensurate with the *California Once-Through Cooling Policy* requirements. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

5.7 Source Water Substrate Filtering/Collection Systems

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

Therefore, due to the highly uncertain nature of the ultimate intake system efficiency and reliability for expected plant life and being a first-of-a-kind technology in scale, it is recommended not to consider this technology further until Phase 2 of the study.

5.8 Variable Speed Cooling Water Pumping Systems

As described in Section 4.2.8, a variable frequency drive or variable speed pump technology alone would not reduce entrainment or impingement mortality at the SONGS intake to a level that is required to meet the *California Once-Through Cooling Policy* requirements. Marginal improvement, up to 20 percent based on optimistic estimates with very conservative assumptions, may be attainable during winter and spring months because of the colder seawater temperature in conjunction with lower power demand. For further impingement improvement, such as to lower the through-screen velocity of 0.5 fps, the plant will have to reduce flow by over 83 percent, which is considered inoperable for the circulating water pumps and not sustainable for a base-load plant. Therefore, this technology is deemed inadequate and not an acceptable technology as far as impingement/entrainment is concerned.

The external approval and permitting of environmental impact and environment offset have been described in detail in Sections 4.1 and 4.3 for a variable speed pumping system.

Because it has been determined that the variable frequency drive or variable speed pump technology, when used as a stand-alone impingement mortality and entrainment control, will not be adequate to provide reduced impingement/entrainment mortalities commensurate with that attainable using a closed-cycle wet cooling system (a set A criterion), no additional assessment is made beyond Section 4.3 for a variable speed pumping system.

6. References

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Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) 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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if the NEPA is triggered, it could involve a 12-18 month review period.	Not applicable	NA	NA
U.S. Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease to allow for addition of a passive air-cooled draft tower on SONGS leased property or adjacent Camp Pendleton lands. This tall tower system will not produce a visible plume, but could impact USMC training programs (low-level helicopter training).	~6 months	No	No
Section 404/10 Permit – U.S. Army Corps of Engineers	Modifying the existing intake system for closed-cycle cooling is likely to have little or no impact on waters of U.S. An individual form of permit will not be required.	Not applicable	NA	No
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – U.S. Army Corps of Engineers	Potentially applicable – modifying the existing intake system for closed-cycle cooling could generate impacts to waters of U.S. that are subject to the nationwide permitting process.	Potentially applicable (1–3 months)	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA review	No	No

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because natural draft towers will be higher than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Superseded by U.S. Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by U.S. Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A passive draft dry/air cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the passive draft dry/air cooling system, the full use of the Mesa Complex by this cooling system may prove to be a contentious issue because of the forced relocation of many resident facilities.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered.	Potential	No
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of passive air-cooled draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year).	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Air Pollution Control District	Not applicable – the passive draft dry/air cooling system towers will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the passive draft dry/air cooling system towers 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 passive draft dry/air cooling system towers will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA

Table CC-2. Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual passive draft dry/air cooling system tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if passive draft dry/air cooling system tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete). Note that recent history indicates this could extend to 4–6 months.	No	No
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Potentially applicable – if the passive draft dry/air cooling system tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – Resource Conservation and Recovery Act Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the passive draft dry/air cooling towers, unless current SONGS ID will be used.	1–2 weeks	No	No

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	SONGS likely will continue to be able to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	No preconstruction permit	No	No
Spill Prevention, Control, and Countermeasure Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	SONGS will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1–2 months plan development	No	No
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	The new passive draft dry/air cooling system towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1–2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new volatile chemicals are needed to support passive draft dry/air cooling system tower operation, a risk management plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater) 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 (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The potential for offsite freshwater to supply the passive draft dry/air cooling system towers is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	No new wells will be developed in support of the saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	No a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of passive draft dry/air cooling system towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No

Table CC-2.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
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 (NCTD/BNSF and Caltrans)	Assuming placement of the passive draft dry/air cooling system towers in the Mesa Complex, three encroachment permits and related engineering study will be needed to support routing of cooling water supply pipes under Interstate-5, U.S. Highway-101.	1–3 months	No	No

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) 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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
U.S. Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease to allow for addition of a passive draft dry/air cooling system towers on SONGS leased property or adjacent Camp Pendleton lands. This tall tower system will not produce a visible plume, but could impact USMC training programs (low-level helicopter training).	~6 months	NA	No
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary – pending next study phase. There are no impacts to jurisdictional waters. Potential impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters).	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary– pending next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because natural draft towers will be taller than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Superseded by U.S. Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-3. Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) > 50 MW, the threshold for review by the CEC. Passive draft dry/air cooling system towers will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the passive draft dry/air cooling system, the full use of the Mesa Complex by this cooling system may prove to be a contentious issue.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered.	Potential	No
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of a passive draft dry/air cooling system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year).	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the passive draft dry/air cooling system towers will not generate any additional operational air emissions.	Not applicable	NA	NA

Table CC-3. Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Land disturbances associated with passive draft dry/air cooling system towers will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of SWPPP.	SWPPP development process (3 months)	No	No
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	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 Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual passive draft dry/air cooling system tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if passive draft dry/air cooling system tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete). Note that recent history indicates this could extend to 4–6 months.	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if passive draft dry/air cooling system tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	The freshwater supply option could demand the addition of onsite wells.	1–2 weeks (freshwater supply option)	No	No

Table CC-3.
Environmental Permit/Approval Assessment: Passive Draft Dry/Air Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement.	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement.	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	No preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of passive draft dry/air cooling system towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	2–3 months	No	No

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
U.S. Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease to allow for addition of a mechanical air-cooled draft tower on SONGS leased property or adjacent Camp Pendleton lands. This tower system will not produce a visible plume, but may impact USMC training operations.	~6 months	No	No
Section 404/10 Permit – U.S. Army Corps of Engineers	Modifying the existing intake system for closed-cycle cooling is likely to have little or no impact on waters of U.S. An individual form of permit will not be required.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – U.S. Army Corps of Engineers	Potentially applicable – modifying the existing intake system for closed-cycle cooling may generate that could be subject to the nationwide permitting process.	Potentially applicable (1–3 months)	No	No

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA), Permanent Facilities	Not applicable – Mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – Mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Superseded by U.S. Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission (CPUC) Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A mechanical (forced) draft dry/air cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the mechanical (forced) draft dry/air cooling tower system, the full use of the Mesa Complex by this cooling system may prove to be a contentious issue.	A 3-to-9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	No
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of mechanical air-cooled draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year).	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Air Pollution Control District	Not applicable – the mechanical (forced) draft dry/air cooling tower system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the mechanical (forced) draft dry/air cooling tower system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete). Note that recent history indicates this could extend to 4–6 months.	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The potential for offsite freshwater to supply the cooling towers is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	No new wells to be developed will be developed in support of the saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No

Table CC-4.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of mechanical (forced) draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	Assuming placement of the mechanical (forced) draft dry/air cooling towers in the Mesa Complex, three encroachment permits and related engineering study will be needed to support routing of cooling water supply pipes under Interstate-5, US Highway-101.	1–3 months	No	No

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
U.S. Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease to allow for addition of mechanical (forced) draft dry/air cooling towers on SONGS leased property or adjacent Camp Pendleton lands. This tower system will not produce a visible plume, but may impact USMC training operations.	~6 months	NA	Potential
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary pending the next study phase. There are no impacts to jurisdictional waters. Potential impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters).	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA review	No	No

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – mechanical (forced) draft dry/air cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by U.S. Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. Mechanical air-cooled draft tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the mechanical (forced) draft dry/air cooling tower system, the full use of the Mesa Complex by this cooling system may prove to be a contentious issue.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	No
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of a mechanical (forced) draft dry/air cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the mechanical (forced) draft dry/air cooling tower system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the mechanical (forced) draft dry/air cooling tower system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	Not applicable – the mechanical (forced) draft dry/air cooling tower system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase Notice of Intent for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete) Note that recent history indicates this could extend to 4–6 months	No	No
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state)	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No

Table CC-5. Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	The freshwater supply option could demand the addition of onsite wells.	1–2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	No a preconstruction approval	No	No

Table CC-5.
Environmental Permit/Approval Assessment: Mechanical (Forced) Draft Dry/Air Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	Although the addition of mechanical (forced) draft dry/air cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	2–3 months	No	No

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of wet natural draft cooling towers on SONGS leased property or adjacent Camp Pendleton lands. The unabated plume from this tower may impact the low–level helicopter training missions and produce deleterious salt deposition impacts to the new Camp residential areas to the northwest. This could be a serious issue.	~6 months	NA	No
Section 404/10 Permit – US Army Corps of Engineers	Modifying the existing intake system for closed-cycle cooling may generate significant impacts to waters of the U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	No
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – US Army Corps of Engineers	Not applicable – modifying the existing intake system for closed-cycle cooling could generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because wet natural draft cooling towers will be taller than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be taller than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	NA	Na
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A wet natural draft cooling system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the wet natural draft tower system (excluding the PM-10 emission offset matter – see air permit discussion in this table), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of a wet natural draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Permit to Construct – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5, which will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District – well below the expected annual PM-10 emissions from SONGS. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	Potentially	Yes
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state nonattainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District – well below the expected annual PM-10 emissions from SONGS. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to operate.	Permit review process is not expected to be successful	No	Yes
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful	No	Yes

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA review	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete) Note that recent history indicates this could extend to 4–6 months	No	No
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No

Table CC-6. Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The potential for offsite freshwater to supply the cooling towers is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	No new wells to be developed will be developed in support of the saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No

Table CC-6.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of wet natural draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	Assuming placement of the wet natural draft cooling towers in the Mesa Complex, three encroachment permits and related engineering study will be needed to support routing of cooling water supply pipes under Interstate-5, US Highway-101.	1–3 months	No	No

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater)
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of a wet natural draft cooling tower on SONGS leased property or adjacent Camp Pendleton lands. The unabated plume from this tower may impact the low–level helicopter training missions. This could be a serious issue.	~6 months	NA	No
Section 404/10 Permit – US Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters. Potential impacts to waters of the U.S. (wetland impacts and discharges of dredge or fill material into waters).	Not applicable	NA	NA
Nationwide Permit – US Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Applicable because wet natural draft cooling towers will be higher than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Applicable because temporary structures (for example, cranes) will be higher than 200 feet above ground level and represent a potential obstruction to local Camp Pendleton aircraft.	1–2 months	No	No
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	No	No
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. A wet natural draft cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the wet natural draft cooling tower system, the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of a wet natural draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	With freshwater and reclaimed water, the wet natural draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Regional Control District Permit to Operate – San Diego Air Pollution Control District	With freshwater and reclaimed water, the wet natural draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	Not applicable – a Title V Federal Operating Permit will not be needed.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board (SWRCB)	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the wet natural draft cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of SWPPP.	Electronic submittal – 1 week process	No	No

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Land disturbances associated with the wet natural draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of SWPPP.	SWPPP development process (3 months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete) Note that recent history indicates this could extend to 4–6 months	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	The freshwater supply option could demand the addition of onsite wells.	1–2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	No a preconstruction approval	No	No

Table CC-7.
Environmental Permit/Approval Assessment: Wet Natural Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	Although the addition of wet natural draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	2–3 months	No	No

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of a wet mechanical (forced) draft cooling tower on SONGS leased property or adjacent Camp Pendleton lands. The unabated plume from this tower may impact the low–level helicopter training missions and produce deleterious salt deposition impacts to the new Camp residential areas to the northwest. This could be a serious issue.	~6 months	NA	No
Section 404/10 Permit – US Army Corps of Engineers	Modifying the existing intake system for closed-cycle cooling may generate significant impacts to waters of the U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	No
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – US Army Corps of Engineers	Not applicable – modifying the existing intake system for closed-cycle cooling could generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide Permitting process.	Not applicable	NA	NA

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – wet mechanical (forced) draft cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – wet mechanical (forced) draft cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC wet mechanical (forced) draft cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the wet mechanical (forced) draft cooling tower system (excluding the PM-10 emission offset issue discussed in the air permit section), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered.	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of wet mechanical (forced) draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year).	Potential	No

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Permit to Construct – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful.	Potentially	Yes
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to operate.	Permit review process is not expected to be successful.	No	Yes
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful.	No	Yes

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete). Note that recent history indicates this could extend to 4–6 months.	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The potential for offsite freshwater to supply the cooling towers is not addressed by this permit.	Not applicable	NA	NA

Table CC-8.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Saltwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
San Diego County Well Water Permit – San Diego County Department of Environmental Health	No new wells will be developed in support of the saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	Although the addition of wet mechanical (forced) draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	Assuming placement of the wet mechanical (forced) draft cooling towers in the Mesa Complex, three encroachment permits and related engineering study will be needed to support routing of cooling water supply pipes under Interstate-5, US Highway-101.	1–3 months	No	No

Table CC-9. Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater) 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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of a wet mechanical (forced) draft cooling towers on SONGS leased property or adjacent Camp Pendleton lands. The unabated plume from this tower may impact the low-level helicopter training missions. This could be a serious issue.	~6 months	NA	No
Section 404/10 Permit – US Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters. Potential impacts to waters of the U.S. (wetland impacts and discharges of dredge or fill material into waters).	Not applicable	NA	NA
Nationwide Permit – US Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – wet mechanical (forced) draft cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – wet mechanical (forced) draft cooling towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. Wet mechanical (forced) draft cooling tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the wet mechanical (forced) draft cooling tower system (excluding the PM-10 emission offsets issue discussed in the air permit section in this table), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of wet mechanical (forced) draft cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	With freshwater and reclaimed water, the wet mechanical (forced) draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	With freshwater and reclaimed water, the wet mechanical (forced) draft cooling towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	Not applicable – a Title V Federal Operating Permit will not be needed.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – no major sources of acid rain air pollution	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Construction projects that emit particulate matter must comply with PM-10 standards via a Dust Control Plan.	Plans development: 1 month	No	No

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater)
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 and State Water Resources Board	Changes in the quantity and quality of the cooling system discharge will necessitate a change in the NPDES permit, which is based on a once-through system. The water withdrawal from the ocean will be discontinued and the discharge will be significantly decreased. There will be changes in the water treatment processes (additional biocides and other treatment chemicals). The modification of the current NPDES permit to reflect the wet mechanical (forced) draft cooling tower system is not expected to generate significant issues.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Land disturbances associated with the wet mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of Notice of Intent and development of Storm Water Pollution Prevention Plan.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Land disturbances associated with the wet mechanical (forced) draft cooling tower system will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of SWPPP.	SWPPP development process (3 months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months (if application complete). Note that recent history indicates this could extend to 4–6 months.	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	SONGS likely will continue to be able to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	No preconstruction permit	No	No

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater) 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	SONGS will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1–2 months plan development	No	No
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1–2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new volatile chemicals are needed to support wet mechanical (forced) draft cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA

Table CC-9.
Environmental Permit/Approval Assessment: Wet Mechanical (Forced) Draft Cooling (Reclaimed and Freshwater) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	The freshwater supply option could demand the addition of onsite wells.	1–2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	Although the addition of wet mechanical (forced) draft cooling towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures,	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	2–3 months	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of a hybrid wet/dry tower on SONGS leased property or adjacent Camp Pendleton lands. The saltwater tower will potentially pose deleterious salt deposition impacts to offsite residential areas.	~6 months	No	No
Section 404/10 Permit – US Army Corps of Engineers	Modifying the existing intake system for closed-cycle cooling may generate significant impacts to waters of the U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	No
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	No
Nationwide Permit – US Army Corps of Engineers	Not applicable – modifying the existing intake system for closed-cycle cooling could significant impacts to waters of the U.S. that cannot be addressed by the nationwide permitting process.	Not applicable	NA	NA

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA Review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – hybrid wet/dry towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – hybrid wet/dry towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. Hybrid wet/dry tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the hybrid wet/dry tower system (with the exception of the PM-10 emission offset issue discussed in the air permit section of this table), the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of hybrid wet/dry cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No

Table CC-10. Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Regional Pollution Control District Permit to Construct – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District – well below the expected annual PM-10 emissions from SONGS. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to construct.	Permit review process is not expected to be successful	Potential	Yes
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Major source air permit will be required to account for the significant emission of PM-10 (>100 tons/year). The San Diego Air Pollution Control District is designated a state non-attainment area for PM-10 and PM-2.5 that will necessitate securing PM-10 emission offsets. Currently, only 207 tons of PM-10 credits are available in this District. Given the improbable case where additional emission offsets can be generated, the lack of sufficient PM-10 offsets will effectively preclude the ability to receive an associated major source air permit to operate.	Permit review process is not expected to be successful	No	Yes
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	A Title V Federal Operating Permit will be needed. The lack of sufficient PM-10 offsets will effectively preclude receipt of this permit.	Permit review process is not expected to be successful	No	Yes
Title IV Acid Rain Permit – USEPA	Not applicable – no major sources of acid rain air pollution.	Not applicable	NA	NA

Table CC-10. Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish and Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete) Note that recent history indicates this could extend to 4–6 months	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	SONGS likely will continue to be able to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not a preconstruction permit	No	No

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
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	SONGS will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1–2 months plan development	No	No
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1–2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new volatile chemicals are needed to support hybrid wet/dry cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA

Table CC-10.
Environmental Permit/Approval Assessment: Saltwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The potential for offsite freshwater to supply the cooling towers is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	No new wells will be developed in support of the saltwater cooling towers.	Not applicable – saltwater option	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of hybrid wet/dry towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	Assuming placement of the hybrid wet/dry towers in the Mesa Complex, three encroachment permits and related engineering study will be needed to support routing of cooling water supply pipes under Interstate-5, US Highway-101.	1–3 months	No	No

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower
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, Right of Way)	Not applicable – if project does not constitute major federal action (new federal land, funding). Please note that if NEPA is triggered it could involve a 12–18 month review period.	Not applicable	NA	NA
Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	USMC Camp Pendleton and ultimately the Department of Navy approvals are needed to amend the lease to allow for addition of a hybrid wet/dry tower on SONGS leased property or adjacent Camp Pendleton lands. The unabated plume from this tower may impact the low-level helicopter training missions. This could be a serious issue.	~6 months	No	No
Section 404/10 Permit – US Army Corps of Engineers	Not applicable – water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – US Army Corps of Engineers & Regional water Quality Control Board	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Nationwide Permit – US Army Corps of Engineers	Not applicable – the water supply is assumed to be available at the site boundary – pending the next study phase. There are no impacts to jurisdictional waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – if eventual cooling tower site area is within a developed or disturbed area (Mesa Complex).	Potentially part of CEQA review	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – hybrid wet/dry towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower
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 – hybrid wet/dry towers will be less than 200 feet above ground level threshold for FAA review.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Superseded by Department of Navy lease arrangement with SONGS.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	12 months nominally	Potential	Potential
California Energy Commission – Final Decision	Not applicable – this process is only applicable if there is a power capacity (increase) >50 MW, the threshold for review by the CEC. Hybrid wet/dry Tower system will not result in increased power output, so there will be no CEC-sponsored CEQA review or specific permits or approvals.	Not applicable	NA	NA

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable for cooling tower development within the coastal zone that includes all of the SONGS property in the Coastal Complex (west or south of I-5) and the Mesa Complex to the east. While there are no initial fatal flaws with the hybrid wet/dry tower system, the extreme height of the tower system and unabated plume could result in visual impacts that are ultimately found unacceptable by the Commission.	A 3- to 9-month process is advertised, but longer if CEQA review process (CEQA/EIR) is triggered	Potential	Potential
Coastal Development Lease – California State Lands Commission and potential CEQA Lead Agency	The State Lands Commission will evaluate the expected impacts to marine environment associated with addition of hybrid wet/dry cooling tower system and determine if a Categorical Exemption (unlikely) or Mitigated Negative Declaration applies. These impacts could trigger the Commission to initiate the CEQA/EIR review process.	Dependent on the duration of the CEQA/EIR process (>1 year)	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	With freshwater and reclaimed water, the hybrid wet/dry towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	With freshwater and reclaimed water, the hybrid wet/dry towers do not require a major source air permit because of PM-10 emissions (<100 tons/year) and will therefore not require PM-10 emission offsets.	Not applicable	NA	NA

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower San Onofre Nuclear Generating Station *(cont.)*

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

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no operational phase NOI for this facility.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water – there is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department Fish and Game	Not applicable – if eventual cooling tower site area is within a developed or disturbed area.	Potentially part of CEQA Review	No	No
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed areas (waters of the state).	1–2 months, (if application complete) Note that recent history indicates this could extend to 4–6 months	No	No
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Potentially applicable – if cooling tower site area disturbance involves impacts to jurisdictional streambed (waters of the state).	4–6 months	No	No
Section 106 Review – Office of Historic Preservation	Potential for Historical Review – part of CEQA review process.	Integral to CEQA review process	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Potentially necessary for construction of the towers, unless current SONGS ID will be used.	1–2 weeks	No	No

Table CC-11. Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	SONGS likely will continue to be able to continue to use their existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	No preconstruction permit	No	No
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	SONGS will likely have to modify their existing SPCC plan in response to potential for new aboveground storage tanks of applicable petroleum materials.	1–2 months plan development	No	No
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	The new cooling towers could force the relocation of underground tanks mandating new permits from the county and revised inspection programs.	1–2 months	No	No
Risk Management Plan (Clean Air Act 112r) – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new volatile chemicals are needed to support hybrid wet/dry cooling tower operation, a Risk Management Plan may be needed to assess the offsite impacts of a release of the subject chemical.	Not a preconstruction requirement	No	No
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	If new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals), additional notification reports will need to be sent to the county.	Not a preconstruction requirement	No	No
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower 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 (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Similar to construction phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned. The delivery of offsite freshwater to the site is not addressed by this permit.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	The freshwater supply option could demand the addition of onsite wells.	1–2 weeks (freshwater supply option)	No	No
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Potentially applicable – if some of the tower elements prove to be oversized.	Not a preconstruction requirement	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Local power poles may be needed during the course of construction.	Not a preconstruction approval	No	No
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	While the addition of hybrid wet/dry towers may require revisions to the existing Fire Safety Plan, the tower system is not expected to include new occupied structures.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable – no new sanitary connections are envisioned.	Not applicable	NA	NA

Table CC-11.
Environmental Permit/Approval Assessment: Reclaimed and Freshwater Hybrid Wet/Dry Tower
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (preconstruction)	Critical Path	Fatal Flaw
Road Crossing or Encroachment Permit (NCTD/BNSF and Caltrans)	The freshwater and reclaimed water pipeline routes have not been determined. Encroachment permits and related engineering studies remain a possibility.	2–3 months	No	No

Table CC-12.
Offsetting Impacts for Passive Draft Dry/Air Cooling
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of SONGS generation during the associated plant outages and the ongoing decreases SONGS output from associated auxiliary loads and reduced thermal efficiency. There are no drift losses or condensed plume from operation of this system. Consequently, there are no particulate emissions (salt) or related impacts	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater – significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased residual biocides in the cooling system. Fresh and Reclaimed Water – an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Only significant makeup required from any of the potential sources is the initial charge of the closed system. No considerable continuous makeup flow required from any of the sources.	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)

Table CC-12.
Offsetting Impacts for Passive Draft Dry/Air Cooling
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Groundwater	Additional groundwater resources have been fully used.	Additional groundwater resources have been fully used.	Not applicable	None	None
Marine Ecological Resources	Saltwater – new localized minor disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater - reduced impingement and entrainment from reduced water withdrawals (+95% reduction in withdrawals, influent velocity <0.5 foot/second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Assessment of loss of acres of sub-tidal habitat pending later assessment phase. +95% reduction in water withdrawals	Limited Negative or None (saltwater) None (fresh and reclaimed water)	Large Positive
Waste	Increased generation of demolition, marine spoils, and construction-related wastes.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Earthwork material balance pending later assessment phase See Section 4.8 for estimated construction wastes to landfill.	Moderate Negative	Small Negative

Table CC-12.
Offsetting Impacts for Passive Draft Dry/Air Cooling
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications.	Increased noise from operation of the cooling tower system (pump, and motor noise).	Construction activities and operation of the passive draft dry/air cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBA at nearest public noise receptor).	Small Negative	Small Negative
Land Use	Construction activities will be occurring on previously occupied, undeveloped, or undisturbed land in the Mesa Complex. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	Section 4.8 for estimated construction and excavation areas.	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Since construction will be confined to the largely developed Mesa Complex, there is limited potential to disturb habitats or other areas with significant ecological value or sensitivity.	The tower system is located in a largely developed area, so there is limited potential for permanent loss of habitat areas or other areas with significant ecological value or sensitivity.	See Section 4.8 for estimated construction and excavation areas.	Small Negative	Small Negative
Cultural & Paleontological Resources	Limited potential for discovery of new cultural or paleontological resources in the newly developed portions of the Mesa Complex.	Operation of the air-cooled system will pose no impacts to cultural or paleontological resources.	Limited potential for discovery of resources.	Small Negative	Small Negative
Visual Resources	The construction of the tall passive draft dry/air cooling towers in the Mesa Complex will have a significant local visual impact.	The tall tower system will produce no visible plume, but will still present a significant visual impact.	See Section 3 for description of technology, including heights.	Large Negative	Large Negative

Table CC-12.
Offsetting Impacts for Passive Draft Dry/Air Cooling
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	There will be no visible plume and no additional fogging or icing impacts.	See Section 4.8 for estimated construction duration.	Small Negative	None
Socioeconomic	While there will be construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase to address cooling tower system operation. There is some minor potential for negative impacts to housing and property markets.	See Section 4.9	Small Positive	Small Negative

Notes: Levels of Impact Significance

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

Table CC-13.
Offsetting Impacts for Mechanical Draft Dry/Air Cooling
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NOx, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of SONGS generation during the associated plant outages and the ongoing decreases SONGS output from associated auxiliary loads and reduced thermal efficiency. There are no drift losses or condensed plume from operation of this system. Consequently, there are no particulate emissions (salt) or related impacts.	Small temporary increase in CO_2 greenhouse gas Emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-13.
Offsetting Impacts for Mechanical Draft Dry/Air Cooling
San Onofre Nuclear Generating Station*) (cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater – significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased residual biocides in the cooling system. Fresh and Reclaimed Water – an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Only significant makeup required from any of the potential sources is the initial charge of the closed system. No considerable continuous makeup flow required from any of the sources. Need velocity and flow characterization?	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)
Groundwater	Additional groundwater resources have been fully used.	Additional groundwater resources have been fully used.	Not applicable	None	None

Table CC-13.
Offsetting Impacts for Mechanical Draft Dry/Air Cooling San Onofre Nuclear Generating Station*) (cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Saltwater – new localized limited disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and reclaimed water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater – reduced impingement and entrainment from reduced water withdrawals (+95% reduction in withdrawals, influent velocity <0.5 foot/second and reduced and appropriate screening). Freshwater and reclaimed water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Sub-tidal land impacts – subsequent assessment +95% reduction in water withdrawals	Limited Negative or None (saltwater) None (fresh and reclaimed water)	Large Positive
Waste	Increased generation of demolition, marine spoils, and construction-related wastes.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Construction wastes – subsequent assessment	Moderate Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications.	Increased noise from operation of the cooling tower system (fan, pump, and motor noise).	Construction activities and operation of the mechanical air cooling draft cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBA at nearest public noise receptor).	Small Negative	Small Negative

Table CC-13.
Offsetting Impacts for Mechanical Draft Dry/Air Cooling
San Onofre Nuclear Generating Station*) (cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities will be occurring on previously occupied, undeveloped, or undisturbed land in the Mesa Complex. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant repurposing of previously occupied, undeveloped, or undisturbed land for industrial purposes.	Construction Area – subsequent assessment	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Since construction will be confined to the largely developed Mesa Complex, there is limited potential to disturb mechanical air cooling draft habitats or other areas with significant ecological value or sensitivity.	The tower system is located in a largely developed area, so there is limited potential for permanent loss of mechanical air cooling draft habitat areas or other areas with significant ecological value or sensitivity.	Construction Area – subsequent assessment	Small Negative	Small Negative
Cultural & Paleontological Resources	Limited potential for discovery of new cultural or paleontological resources in the newly developed portions of the Mesa Complex.	Operation of the air-cooled system will pose no impacts to cultural or paleontological resources.	Limited potential to discover resources.	Small Negative	None
Visual Resources	The low profile mechanical air cooling draft cooling towers in the Mesa Complex will have a limited visual impact.	The low profile tower system will produce no visible plume, nor lead to increased fogging conditions.	Cooling system will be visible, but not visually significant.	Small Negative	None
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	There will be no condensed plume and so additional fogging or icing impacts to nearby roads and associated traffic.	Traffic assessments will be subject of a pending study.	Small Negative	None

Table CC-13.
Offsetting Impacts for Mechanical Draft Dry/Air Cooling
San Onofre Nuclear Generating Station) *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic	While there will be construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase to address cooling tower system operation. There is some minor potential for negative impacts to housing and property markets.	Construction workforce increases will be subject of subsequent study.	Small Positive	Small Negative

Notes: Levels of Impact Significance

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

Table CC-14.
Offsetting Impacts for Wet Natural Draft Towers
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short-term loss of SONGS generation during the associated plant outages and the ongoing decreases SONGS output from associated auxiliary loads and reduced thermal efficiency. Saltwater – Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased volatile organic compound emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water – Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional (pending) tons of CO_2 greenhouse gas emissions from associated plant outages. Additional (pending) tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. Additional 916 tons/year of PM-10 from cooling systems. Additional significant volatile organic compound from painting and volatile organic compound finishing operations.	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-14.
Offsetting Impacts for Wet Natural Draft Towers
San Onofre Nuclear Generating Station*) (cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling, and related spills. Construction activities will have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater – significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water – decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	See Section 4.8 for details regarding construction earthwork.	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)
Groundwater	Additional groundwater resources have been fully used.	Additional groundwater resources have been fully used.	Not applicable	None	None

Table CC-14.
Offsetting Impacts for Wet Natural Draft Towers
San Onofre Nuclear Generating Station) *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Saltwater – new localized disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater – reduced impingement and entrainment from reduced water withdrawals (90%–95% reduction in withdrawals, influent velocity <0.5 foot/second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Sub-tidal impacts – subsequent assessment. 90%–95% reduction in water withdrawals	Limited Negative or None	Large Positive
Waste	Increased generation of demolition, marine spoils, and construction-related wastes.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Waste volume – subsequent assessment	Small Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications.	Increased noise from operation of the cooling tower system (cascading water, pump, and motor noise).	Construction activities and operation of the natural draft cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBA at nearest public noise receptor).	Small Negative	Small Negative

Table CC-14.
Offsetting Impacts for Wet Natural Draft Towers
San Onofre Nuclear Generating Station) *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities will be occurring on previously occupied, undeveloped, or undisturbed land in the Mesa Complex. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant re-purposing of previously occupied, undeveloped, or undisturbed land for industrial purposes.	Construction area – subsequent assessment.	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Since construction will be confined to the largely developed Mesa Complex, there is limited potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	The tower system is located in a largely developed area, so there is limited potential for permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity. There may be some salt deposition impacts to salt sensitive vegetation.	Construction area – subsequent assessment.	Small Negative	Small Negative
Cultural & Paleontological Resources	Limited potential for discovery of new cultural or paleontological resources in the newly developed areas.	Increased salt deposition and plume impaction from the tower operation may accelerate decay of local surface resources.	Salt deposition 916 tons/year on surrounding lands.	Small Negative	Small Negative
Visual Resources	New temporary visual impact to local areas from construction cranes and other high profile construction equipment.	Generation of significant visual impacts from tall cooling tower structures and the associated plumes, including possible impacts to local USMC training operations.	Significant visual impact from the construction and operation of these tall towers.	Moderate Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Increased hours of local fogging and icing on local roads and impacts to low altitude USMC helicopter training activities from nearby Camp Pendleton.	Significant fogging impacts on local roads – will be subject of subsequent study, as needed.	Small Negative	Moderate Negative

Table CC-14.
Offsetting Impacts for Wet Natural Draft Towers
San Onofre Nuclear Generating Station*) (cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic	While there will be construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets.	Construction workforce impacts will be the subject of subsequent assessment, as needed.	Small Positive	Small Negative

Notes: Levels of Impact Significance

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

Table CC-15.
Offsetting Impacts for Wet Mechanical Draft Cooling System
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of SONGS generation during the associated plant outages and the ongoing decreases SONGS output from associated auxiliary loads and reduced thermal efficiency. Saltwater – Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased volatile organic compound emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water – Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional (pending) tons of CO_2 greenhouse gas emissions from associated plant outages. Additional (pending) tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. Additional 916 tons/year of PM-10 from cooling systems. Additional significant volatile organic compound from painting and refinishing operations.	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-15.
Offsetting Impacts for Wet Mechanical Draft Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling, and related spills. Construction activities will have the potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater – significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water – decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Velocity and flow characterization – subsequent assessment.	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)
Groundwater	Additional groundwater resources have been fully used.	Additional groundwater resources have been fully used.	N/A	None	None

Table CC-15.
Offsetting Impacts for Wet Mechanical Draft Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Saltwater – new localized limited disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater – reduced impingement and entrainment from reduced water withdrawals (90%–95% reduction in withdrawals, influent velocity <0.5 foot/second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Sub-tidal impacts – subsequent assessments 90%–95% reduction in withdrawals	Limited Negative or None	Large Positive
Waste	Increased generation of demolition, marine spoils, and construction-related wastes.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Waste Volume – subsequent assessment	Small Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications.	Increased noise from operation of the cooling tower system (cascading water, pump, and motor noise).	Construction activities and operation of the wet mechanical draft cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBA at nearest public noise receptor).	Small Negative	Small Negative

Table CC-15.
Offsetting Impacts for Wet Mechanical Draft Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities will be occurring on previously occupied, undeveloped, or undisturbed land in the Mesa Complex. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant repurposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	Construction Area – subsequent assessment	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Since construction will be confined to the largely developed Mesa Complex, there is limited potential to disturb wet mechanical draft habitats or other areas with significant ecological value or sensitivity.	The tower system is located in a largely developed area, so there is limited potential for permanent loss of wet mechanical draft habitat areas or other areas with significant ecological value or sensitivity. The salt deposition could pose some impacts to salt-sensitive vegetation.	Construction Area – subsequent assessment	Small Negative	Small Negative
Cultural & Paleontological Resources	Limited potential for discovery of new cultural or paleontological resources in the newly developed areas.	Increased salt deposition and plume impaction from the tower operation may accelerate decay of local surface resources.	Salt deposition 916 tons/year on surrounding lands	Small Negative	Small Negative
Visual Resources	The low profile wet mechanical draft cooling towers in the Mesa Complex will have a limited visual impact.	Generation of significant visual impacts from tall cooling tower structures and the associated plumes, including possible impacts to local USMC training operations.	The plumes from operation of this system will be significant.	Small Negative	Large Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Increased hours of local fogging and icing on local roads and impacts to low altitude USMC helicopter training activities from nearby Camp Pendleton.	Traffic assessments will be the subject of subsequent studies, as needed.	Small Negative	Moderate Negative

Table CC-15. Offsetting Impacts for Wet Mechanical Draft Cooling System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic	While there will be construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets.	Construction workforce impacts will be the subject of a subsequent assessment, as needed.	Small Positive	Small Negative

Notes: Levels of Impact Significance

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

Table CC-16.
Offsetting Impacts for Hybrid Wet/Dry Cooling System
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and commuting workforce. Fugitive dust emissions from land disturbance and potential concrete batch plant.	Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short-term loss of SONGS generation during the associated plant outages and the ongoing decreases SONGS output from associated auxiliary loads and reduced thermal efficiency. Saltwater – Increased salt deposition from cooling tower drift emissions will impact offsite salt-sensitive vegetation and increase onsite equipment corrosion potential. There will be increased volatile organic compound emissions from supplemental corrosion control measures (resurfacing/painting). The salt emissions could pose visibility impacts on sensitive Class I areas in Southern California. Fresh and Reclaimed Water – Some salt deposition from cooling tower drift emissions. Onsite corrosion and Class I visibility should not be an issue.	Small temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage. Additional (pending) tons of CO_2 greenhouse gas emissions from associated plant outages. Additional (pending) tons/year of CO_2 greenhouse gas emissions from unit from reduced plant efficiency. Additional 916 tons/year of PM-10 from cooling systems. Additional significant volatile organic compound from painting and refinishing operations.	Small Negative	Large Negative (saltwater) Small Negative (fresh and reclaimed water)

Table CC-16.
Offsetting Impacts for Hybrid Wet/Dry Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Surface Water	Increased potential for soil erosion and sedimentation as well as other storm water contamination threats from material storage, handling, and related spills. Construction activities have limited potential to generate turbidity impacts from disruption of nearshore habitats near the intake where some marine work will be pursued.	Saltwater – significantly reduced seawater withdrawals, reduced thermal discharge impacts (lower temperature, reduced flow), and increased salinity and residual biocides in the cooling system discharge. Fresh and Reclaimed Water – decrease in salinity and an increase in residual biocides in the cooling system discharge. This involves an industrial use of an otherwise potable water source and a wastewater.	Velocity and Flow Characterization – subsequent assessment	Moderate Negative	Small Positive (saltwater, reclaimed water) Small Negative (freshwater)
Groundwater	Additional groundwater resources have been fully used.	Additional groundwater resources have been fully used.	Not applicable	None	None

Table CC-16. Offsetting Impacts for Hybrid Wet/Dry Cooling System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Saltwater – new localized limited disruptions to inshore marine habitat from installation of new inshore intake system. Fresh and Reclaimed Water – no impacts to marine resources.	Marginal loss of inshore marine habitat. Saltwater – reduced impingement and entrainment from reduced water withdrawals (90%–95% reduction in withdrawals, influent velocity <0.5 foot/second and reduced and appropriate screening). Freshwater and Reclaimed Water – no seawater withdrawals, so no impingement or entrapment impacts to marine life.	Sub-tidal impacts – subsequent assessment 90%–95% reduction in water withdrawals	Limited Negative or None	Large Positive
Waste	Increased generation of demolition, marine spoils, and construction-related wastes.	Increased generation of wastes from cooling tower maintenance activities and collection of wastes from the modified inshore intake system.	Waste Volume – subsequent assessment	Small Negative	Small Negative
Noise	Increased noise from construction activities associated with development of the cooling tower installation and associated intake modifications.	Increased noise from operation of the cooling tower system (cascading water, pump, and motor noise).	Construction activities and operation of the hybrid wet/dry cooling cycle system will not result in an exceedance of the local noise criteria (nominally 70 dBA at nearest public noise receptor).	Small Negative	Small Negative

Table CC-16.
Offsetting Impacts for Hybrid Wet/Dry Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities will be occurring on previously occupied, undeveloped, or undisturbed land in the Mesa Complex. Some marine work will be necessary to modify the inshore portions of the existing intake system.	Significant repurposing of previously occupied, undeveloped or undisturbed land for industrial purposes.	Construction area – subsequent pending assessments	Moderate Negative	Moderate Negative
Terrestrial Ecological Resources	Since construction will be confined to the largely developed Mesa Complex, there is limited potential to disturb sensitive habitats or other areas with significant ecological value or sensitivity.	The tower system is located in a largely developed area, so there is limited potential for permanent loss of habitat areas or other areas with significant ecological value or sensitivity. The salt deposition could have an impact on salt-sensitive species.	Construction area – subsequent pending assessments	Small Negative	Small Negative
Cultural & Paleontological Resources	Limited potential for discovery of new cultural or paleontological resources in the newly developed areas.	Increased salt deposition and plume impaction from the tower operation may accelerate decay of local surface resources.	Salt deposition 916 tons/year on surrounding lands	Small Negative	Small Negative (saltwater)
Visual Resources	The 175 foot towers will be a prominent feature in the low profile Mesa Complex.	Plume abatement features will mitigate visible plume issue, but towers will remain prominent feature in the Mesa Complex.	The hybrid system will be a prominent feature – visible to nearby residents.	Moderate Negative	Moderate Negative
Transportation	Increased traffic from the construction workforce will worsen the existing level of service on local roads.	Limited additional fogging and icing impacts on local roads and impacts to local aviation.	The traffic assessment will be the subject of a separate study. The fogging impacts will be relatively rare events.	Small Negative	Small Negative

Table CC-16.
Offsetting Impacts for Hybrid Wet/Dry Cooling System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic	While there will be construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase to address cooling tower system operation and corrosion mitigation (for the salt tower system). There is some minor potential for negative impacts to housing and property markets.	Construction workforce impacts will be the subject of a subsequent assessment, as needed.	Small Positive	Small Negative

Notes: Levels of Impact Significance

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

Table CC-17.
San Diego APC Emission Reduction Credit Banking Registry Summary
December 30, 2011

Company Name	Certificate No.	PM-10	SO_x
Castillo Power II, LLC	978938-02	0.0	0.0
	978938-03	2.8	0.0
	978938-04	0.0	8.1
	981518-03	0.0	0.0
	951518-04	0.1	0.7
City of San Diego, Metropolitan Wastewater Department	950766-04	0.63	
Dynegy South Bay, LLC	2011-000050-04	12.6	
Element Markets	070823-04		0.3
	070823-05	0.3	
General Dynamics, Convair	951022-04		0.1
	951022-04	1.5	
General Dynamics Property, Inc.	970809-03	0.46	
	970809-04		0.02
Grey K Environmental Fund, LP	060328-08	0.2	
	060328-07	0.4	
Hanson Aggregates, Pacific SW Region	980772-04	0.09	
HG Fenton Material Company	41106-03	129.10	
	930902-04	1.06	
	930902-05		1.0
	975070-03	0.1	
	975070-04		0.1
	975733-03	0.2	
National Steel & Shipbuilding	40994-01	0.1	
	40995-01	0.09	
	40995-05		0.27
	40996-01	0.01	
	40996-04		0.35
	40997-01	0.45	
	40997-05		0.04
Naval Station, San Diego	950949-03	1.09	
	950949-02	0.04	
	940206-05		0.04
NAVERUS, Inc.	040203-02	0.1	
	978227-03	0.1	
	981024-02	0.17	
	981024-05		0.09
	981954-03		0.28
	981954-04	0.61	

Table CC-17.
San Diego APC Emission Reduction Credit Banking Registry Summary
December 30, 2011 *(cont.)*

Company Name	Certificate No.	PM-10	SOx
Olduvai Gorge, LLC	091004-04	0.85	
	091004-05		0.1
Po Pico Energy Center, LLC	2011-000048-04	27.40	
	2011-000048-05		1.8
	2011-000049-04	9.50	
	2011-000049-05		1.7
Ralston Purina	50055-01	0.5	
	50055-02		4.6
SDG&E	921291-04	2.9	
South Coast Materials Company	940101-04	2.9	
	940101-01	10.8	
	950171-04	0.01	
	950171-05		0.1
STMicroelectronics, Inc.	978887-04	0.1	
SW Division, Naval Facilities Engineering Command	970312-01	2.0	
US Foam	974375-05	0.1	
UN Communication Station	940560-02		0.49
	940560-03	0.34	
	940561-04		0.01
	940561-04		0.01
TOTAL (tons/yr)		206.81	20.21

Re: http://www.sdapcd.org/permits/ERCs.pdf).

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 (new 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	Installation of the deepwater intake system, either via cut-and-fill processes will generate significant impacts to waters of U.S. and will involve work in navigable waters. An 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 & Regional Water Quality Control Board	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 U.S. that cannot be addressed by the nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the deepwater offshore intake system poses significant impacts to 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, Permanent Facilities	Not applicable – 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 above ground level.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by Department of Navy lease arrangement with SONGS. The addition of the deepwater intake system will occupy some additional onshore area within the leased area, but it is unlikely to generate significant exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	~12 months	Potential	No
California Energy Commission – 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

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 Permit – California Coastal Commission/Local Coastal Programs	Applicable because of the considerable offshore and nearshore development within the coastal zone. While there are no specific fatal flaws with the deepwater intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to support a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the deepwater intake system, the significant construction related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to support a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct – 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 – 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

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
Dust Control Plan – San Diego Air Pollution Control District	Potentially applicable – construction of the deepwater offshore intake system is expected to impact a small onshore area, so there is little potential to generate significant dust emissions that would demand a specific plan. The deepwater intake system itself will not generate any additional air emissions.	If applicable (<1 month)	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	The deepwater intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – construction of the deep offshore intake system is expected to impact a small onshore area, but not significantly alter storm water management features onsite.	Not applicable (if impacted area <1 acre)	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – construction of the deep offshore intake system is expected to impact only a small onshore area and not significantly or alter the storm water management features onsite.	Not applicable (if impacted area <1 acre	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	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

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
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish and Game Department	Not applicable – The installation of the deepwater intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the deepwater offshore intake system will not result in impacts to jurisdictional streambed areas (Waters of the State).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the deep offshore intake system will not result in impacts to jurisdictional streambed areas (Waters of the State).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the deep offshore intake system will use an additional small onshore area that has already been disturbed.	Not applicable	NA	NA
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San 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 used.	1–2 weeks	No	No

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
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 use of the existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San 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 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 – 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 to be stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	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
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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
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 are to be developed.	Not applicable	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	The deep offshore intake components and associated piping will be oversized.	~1 month	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	The deep offshore intake components and associated piping will be oversized.	~1 month	No	No
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 present 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, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short-term loss of SONGS generation during the plant outage to install the new deeper velocity cap system.	Although 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 remain largely unchanged.	Significant disruption of subaqueous lands.	Large Negative	None
Groundwater	No additional groundwater resources are available – they have been fully used.	No additional groundwater resources are available – they have been fully used.	Not applicable	None	None
Waste	Significant marine sediment wastes will be generated to facilitate installation of the additional offshore piping system.	Potential increase in waste generation from maintenance activities and kelp-related impacts on the new velocity cap system in deeper water.	Marine Spoil Wastes (pending subsequent assessment phase)	Moderate Negative	Moderate Negative

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake System
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).	Reduced impingement and entrainment impacts (contingent on a less biologically active zone in deeper water, which is not supported by available data). 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	None
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	NA	NA

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

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas. There is some potential for marine resource impacts.	No permanent onshore loss of cultural or paleontological resources.	Potential for marine-based resource impacts is limited.	Small Negative	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The deepwater intake system will be submerged and present no permanent change in external profile of the facility.	Not applicable	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	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 (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the deepwater intake system. Related impacts to housing and property are limited – most local housing and land in Camp Pendleton is not subject to sale to the public.	Workforce (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact Significance

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

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake)
San Onofre Nuclear Generating Station

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – Bureau of Land Management or Other Responsible Lead Federal Agency (Record of Decision, Right-of-Way)	Not applicable – the addition of the shoreline intake system does not constitute major federal action (new federal land, funding).	Not applicable	NA	NA
U.S. Department of Navy and U.S. Marine Corps – Camp Pendleton Lease	Not applicable – USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease for significant additions to the SONGS leased property or adjacent Camp Pendleton lands. The intake system will not demand any additional onshore new federal land, nor involve any exterior changes to existing structures. Note that modification to the breakwater facility could be trigger for Camp Pendleton approval.	~6 months (if applicable)	No	No
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the shoreline intake system will generate significant impacts to waters of the United States.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the installation of the shoreline intake system will generate significant impacts to waters of the United States that cannot be addressed by the nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the shoreline intake system poses significant impacts to local marine habitat and aquatic life, but does not offer any tangible reductions in impingement or entrainment impacts.	Connected to CEQA process	No	No

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable – the addition of the shoreline intake system will not result in any significant exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA	Not applicable – the addition of the shoreline intake system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by U.S. Department of Navy lease arrangement with SONGS. The addition of the shoreline intake system will not require any additional land, nor involve any significant exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the shoreline intake system will not result in a net power capacity (increase) >50 MW, the threshold for CEC review.	Not applicable	NA	NA
Coastal Development Permit California Coastal Commission/Local Coastal Programs	Applicable because of the considerable nearshore development within the Coastal Zone While there are no specific fatal flaws with the shoreline intake system, the significant construction-related marine habitat impacts and inability to appreciably reduce impingement or entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the shoreline intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the shoreline intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the shoreline 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 shoreline intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the shoreline 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 shoreline intake system is expected to disturb some onshore and near shore areas, but there is little potential to generate significant dust emissions or demand a specific control plan. The system itself will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	The shoreline 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

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Land disturbances associated with the development of new breakwaters will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of a SWPPP.	Electronic submittal – 1 week process	No	No
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Land disturbances associated with the development of new breakwaters will substantially exceed the 1 acre threshold level necessitating the submittal of NOI and development of a SWPPP.	SWPPP development process (3 months)	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the shoreline intake system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	The installation of the shoreline intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the shoreline intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the shoreline intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the shoreline 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 shoreline intake system could potentially require an identification number to support management or construction wastes, unless current SONGS identification will be used.	1–2 weeks	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Not applicable – the addition of the shoreline intake system will allow for the continuing use of the existing hazardous waste identification number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the shoreline intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake) San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	Not applicable – the addition of the shoreline intake system is not expected to require 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 shoreline intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the shoreline intake system is not expected to require any new chemicals stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (U.S. Marine Corps Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA

Table IR-1.
Environmental Permit/Approval Assessment: Initial Intake Relocation (Shoreline Intake)
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Not applicable – similar to the construction-phase SWPPP. No separate submittal is expected to be directed to the county since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 shoreline intake elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable – the shoreline intake elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – the installation of the shoreline 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 shoreline 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 shoreline intake system will not present any road crossing or encroachment issues.	Not applicable	NA	NA

Table IR-2. Offsetting Impacts for the Inshore 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, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, and 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 this system.	While the inshore system could result in some minor improvements in plant efficiency, there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate turbidity impacts from disruption of nearshore habitats.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	Marine area impacted (pending subsequent assessment phase, if any)	Moderate Negative	None
Groundwater	No additional groundwater resources are available.	No additional groundwater resources are available.	Not applicable	None	None
Waste	Significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Minor increase in waste generation from maintenance activities on the submerged inshore screen systems.	Marine spoil wastes (pending subsequent assessment phase, if any)	Moderate Negative	None
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 inshore 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 nearshore and they may temporarily preclude normal recreational activities in nearby waters.	The reconfiguration of the inshore intake system represents a change in land use of some nearshore areas, but will not preclude waterborne activities or access along the beach.	Work Schedule (pending subsequent assessment phase, if any)	Small Negative	None

Table IR-2. Offsetting Impacts for the Inshore Intake System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat).	No improvements in impingement or entrainment impacts are expected given the shift of the intake nearshore areas. Overall water withdrawal or discharge rates are unchanged. Thermal discharge impacts to aquatic life will remain largely unchanged.	Marine bed area (pending subsequent assessment phase, if any)	Moderate Negative	Small Negative
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	NA	NA
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	NA	NA
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures. However, there will be work areas visible from the ocean as new land features are developed.	The inshore intake system will include new land features that will be visible from the ocean and nearby beach areas.	The additional breakwater lands will not represent a significant change to the character of this area, but it will be visible.	Small Negative	Small Negative
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The inshore intake system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce, Level of Service (pending subsequent assessment phase, if any)	Small Negative	None

Table IR-2. Offsetting Impacts for the Inshore Intake System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase slightly in response to the increased cleaning and marine waste management duties associated with the inshore intake system. Related impacts to housing and property are limited – most local housing and land in Camp Pendleton is not subject to sale to the public.	Workforce (pending subsequent assessment phase, if any)	Small Positive	None

Notes: Levels of Impact Significance

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

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen 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 inshore fine screen intake system does not constitute major federal action (new 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 intake system will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the inshore fine screen intake system will generate significant impacts to waters of the U.S.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the installation of the inshore fine screen intake system will generate significant impacts to waters of U.S. that likely cannot be addressed by the nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	While installation of the inshore fine screen intake system poses significant impacts to local marine habitat and aquatic life, it potentially reduces impingement impacts.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – the addition of the addition of the inshore fine screen intake system will not result in any significant exterior changes to existing structures.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen 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 inshore fine screen intake system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by Department of Navy lease arrangement with SONGS. The addition of the inshore fine screen intake system will not require any additional land, nor involve any significant exterior changes to existing onshore structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the inshore fine screen intake system will not result in a net power capacity (increase) >50 MW, the threshold for CEC review.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable because of the considerable nearshore development within the Coastal Zone. While there are no specific fatal flaws with the inshore fine screen intake system, the significant construction-related marine habitat impacts and limited ability to further reduce impingement or offer positive benefits regarding entrainment are likely to support a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the inshore fine screen intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to support a challenging approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct – San Diego Regional Air Pollution Control District	Not applicable – the inshore fine screen intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the inshore fine screen 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 inshore fine screen intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the inshore fine screen intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table IFMS-1. Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – construction of the inshore fine screen intake system is expected to impact only a small onshore area, so there is little potential to generate significant dust emissions, which would demand a control plan. The system itself will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	The inshore fine screen intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – construction of the inshore fine screen intake system is expected to impact only a small onsite area and not significantly alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – construction of the inshore fine screen intake system is expected to impact only a small area and not significantly alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the inshore fine screen intake system.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	The installation of the inshore fine screen intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the inshore fine screen intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the inshore fine screen intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the inshore fine screen intake system will impact a small onshore area that has been previously disturbed.	Not applicable	NA	NA
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Installation of the inshore fine screen intake system could potentially require an ID number to support management or construction wastes, unless current SONGS ID will be used.	1–2 weeks	No	No

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation - Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Not applicable – the addition of the inshore fine screen intake system will allow for the continuing use of the existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the inshore fine screen 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 inshore fine screen intake system is not expected to require 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 inshore fine screen intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the inshore fine screen intake system is not expected to require any new chemicals to be stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA

Table IFMS-1.
Environmental Permit/Approval Assessment: Inshore Fine Screen Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 inshore fine screen intake elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable – the inshore fine screen intake elements and associated piping are not expected to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – the installation of the inshore fine screen 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 inshore fine screen 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 inshore fine screen intake system will not present any road crossing or encroachment issues.	Not applicable	NA	NA

Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen System
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NO_x, volatile organic compound, CO, and PM 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 this system.	Although the inshore system could result in some minor improvements in plant efficiency, there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate turbidity impacts from disruption of nearshore habitats.	Operational cooling water withdrawal and discharge rates will be largely unchanged.	Marine Area Impacted (pending a subsequent assessment phase)	Moderate Negative	None
Groundwater	No additional groundwater resources will be available.	No additional groundwater resources will be available.	Not applicable	None	None
Waste	Marine sediment wastes will be generated to facilitate installation of the inshore system.	Moderate increase in waste generation from maintenance activities on the partially submerged screen systems.	Marine Spoil Wastes (pending subsequent assessment phase)	Moderate Negative	Moderate Negative
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and 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 inshore fine screen system.	Noise impacts above the 70 dBA threshold value may occur along shoreline during construction.	Small Negative	None

Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities are primarily nearshore and they may temporarily preclude normal recreational activities in nearby waters.	The reconfiguration of the inshore fine screen system represent a change in land use of some nearshore areas, but will not preclude waterborne activities or access along the beach.	Work Schedule (pending subsequent assessment phase)	Small Negative	None
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat).	Some further reduction of impingement and entrainment. Overall water withdrawal or discharge rates are unchanged. Thermal discharge impacts to aquatic life will remain largely unchanged.	Marine Bed Area (pending subsequent assessment phase)	Moderate Negative	Moderate Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of onshore or nearshore cultural or paleontological resources.	Not applicable	None	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The inshore fine screen system will be mostly submerged and present no permanent change in external profile of the facility.	Not applicable	None	None

Table IFMS-2.
Offsetting Impacts for the Inshore Fine Screen System
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The inshore fine screen system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce and Level of Service (pending subsequent assessment phase)	Small Negative	None
Socioeconomic Issues	Although there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels may increase slightly in response to the increased cleaning and marine waste management duties associated with the inshore fine screen intake system. Related impacts to housing and property are limited – most local housing and land in Camp Pendleton is not subject to sale to the public.	Workforce (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact Significance

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

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
San Onofre Nuclear Generating Station

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – the addition of the wedge wire system does not constitute major federal action (new federal land, funding).	Not applicable	NA	NA
U.S. Department of Navy and United States Marine Corps – Camp Pendleton Lease	Not applicable – USMC Camp Pendleton and ultimately the U.S. Department of Navy approvals are needed to amend the lease for significant additions to the SONGS leased property or adjacent Camp Pendleton lands. The wedge wire system will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the wedge wire system, either via cut-and-fill processes or tunneling, will generate significant impacts to waters of the U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the installation of the wedge wire system will generate significant impacts to waters of the U.S. that cannot be addressed by the nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the offshore wedge wire screen system poses significant impacts marine habitat and aquatic life and also serves to reduce operational impingement losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration, Permanent Facilities	Not applicable – the addition of the addition of the wedge wire system will not result in any exterior changes to existing structures.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Proposed Construction or Alteration – FAA, Temporary Construction Facilities	Not applicable – the addition of the wedge wire screen system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by U.S. Department of Navy lease arrangement with SONGS. The addition of the wedge wire system will not require any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
California Public Utilities Commission Approval	Although the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process triggers development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the wedge wire system will not result in a net power capacity (increase) >50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Applicable because of the considerable offshore and nearshore development within the coastal zone. Although there are no specific fatal flaws with the wedge wire system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. Although there are no specific fatal flaws with the wedge wire system, the significant construction-related marine habitat impacts and associated limited reduction in operational impingement losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the wedge wire system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the wedge wire screen system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – San Diego Air Pollution Control District and USEPA	Not applicable – the wedge wire screen system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the wedge wire screen system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – construction of the wedge wire screen system is expected to disturb little or no onshore areas, so there is little potential to generate significant dust emissions. The wedge wire system itself will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	The wedge wire system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – construction of the wedge wire screen system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – construction of the wedge wire screen system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the wedge wire screen system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Department of Fish & Game	The installation of the wedge wire system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the offshore wedge wire screen system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the offshore wedge wire screen system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Section 106 Review – Office of Historic Preservation	Not applicable – the offshore wedge wire screen system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA
Notification of Waste Activity – Resource Conservation and Recovery Act 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 wedge wire screen system could potentially require an identification number to support management or construction wastes, unless current SONGS identification will be used.	1–2 weeks	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Not applicable – the addition of the wedge wire system will allow for the continuing use of the existing hazardous waste identification number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the wedge wire system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	Not applicable – the addition of the wedge wire system is not expected to require the relocation of underground tanks.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/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 wedge wire system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the wedge wire system is not expected to require any new chemicals quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA

Table WW-1.
Environmental Permit/Approval Assessment: Modular Wedge Wire Screen System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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	The wedge wire screen elements and associated piping will be oversized.	<1 month	No	No
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	The wedge wire screen elements and associated piping will be oversized.	<1 month	No	No
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – the installation of the wedge wire system is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The addition of wedge wire system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No
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 wedge wire system will not present any road crossing or encroachment issues.	Not applicable	NA	NA

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
San Onofre Nuclear Generating Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of SONGS generation during the plant outage to install wedge system.	Although the wedge wire system could result in some reduction of plant efficiency, there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands. Cut-and-fill installation practices will be more disruptive than the tunneling option.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	Significant impacts to subaqueous lands.	Large Negative – cut and fill Moderate Negative – tunneling	None
Groundwater	No additional groundwater resources will be available.	No additional groundwater resources will be available.	Not applicable	None	None
Waste	Significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Likely increase in waste generation from maintenance activities on the submerged modular screen systems and potential kelp interactions.	Marine spoil wastes (pending subsequent assessment phase)	Moderate Negative	Moderate Negative
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and 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 wedge wire system.	Noise impacts above the 70 dBA threshold value may occur along shoreline during construction.	Small Negative	None

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters.	The wedge wire screen modules and associated piping represent a change in land use of the marine bed and could preclude some waterborne activities.	Work schedule (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). These impacts will be more significant for the cut-and-fill installation option then the tunneling option.	Further reduction of impingement impacts that are already partially mitigated. Overall water withdrawal or discharge rates are unchanged. Entrainment impacts may be somewhat reduced, but and the thermal discharge impacts to aquatic life will remain largely unchanged.	Marine bed area (pending subsequent assessment phase)	Large Negative – cut and fill Moderate Negative – tunneling	Moderate Positive
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	NA	NA
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas. There is potential for marine-based resource impacts.	No permanent loss of cultural or paleontological resources.	Potential for impacts to marine based resources is minimal.	Small Negative	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The wedge wire 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	The wedge wire screen system will not	Workforce and Level of	Small Negative	None

Table WW-2.
Offsetting Impacts for the Offshore Modular Wedge Wire Screen
San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
	workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	significantly alter the current number of plant deliveries or operating personnel.	Service (pending subsequent assessment phase)		
Socioeconomic Issues	Although there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the wedge wire system. Related impacts to housing and property are limited – most local housing and land in Camp Pendleton is not subject to sale to the public.	Workforce (pending subsequent assessment phase)	Small Positive	None

Notes: Levels of Impact Significance

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

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the operational strategies system does not constitute major federal action (new 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 operational strategies will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Implementation of some of the operational strategies could impact waters of U.S. and could lead to the need for an individual form of the permit.	120 days from complete application (goal) ~12 months (expected)	No	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	No	NA
Nationwide Permit – U.S. Army Corps of Engineers	The implementation of operational strategies could generate modest impacts to waters of the U.S., which could potentially be addressed by the nationwide permitting process.	1–3 months	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – the addition of the operational strategies water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA

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

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

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Not applicable – the operational strategies system will not demand any additional land, nor involve any exterior changes to existing structures in the Coastal Zone.	Not applicable	NA	NA
Coastal Development Lease – California State Lands Commission	The operational strategies system will involve some limited work in the marine environment.	Connected to CEQA (~9 months)	Potential	No
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the strategies will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate – San Diego Air Pollution Control District	Not applicable – the strategies system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – Sand Diego Air Pollution Control District and USEPA	Not applicable – the strategies system will not generate any additional operational air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the strategies system will not generate any additional operational acid rain-related air emissions.	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces, so will not generate any significant supplemental dust emissions. The strategies themselves, in operation, will not generate any additional dust emissions.	Not applicable	NA	NA

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	The operational strategies will alter some aspects of intake operation, but will not change the peak water withdrawal rates, nor appreciably change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – implementation of the operational strategies is not expected to significantly disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the operational strategies system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
2081 Permit for California Endangered Species Act of 1984– California Department of Fish & Game	Not applicable – the implementation of operational strategies water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the implementation of operational strategies will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the operational strategies will not demand any additional land nor disturb any previously undisturbed surface.	Not applicable	NA	NA
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health - California Unified Program Agency	Implementation of the strategies could potentially require an ID number to support management or construction wastes, unless current SONGS ID will be used.	1–2 weeks	No	No
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation – Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Not applicable – the implementation of the operational strategies will allow for the continuing use of the existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
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 implementation of the operational strategies 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 implementation of the operational strategies is not expected to require 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 implementation of the operational strategies will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health - California Unified Program Agency and USEPA	Not applicable – the implementation of the operational strategies is not expected to require any new chemicals to be stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA

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

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Not applicable – similar to the construction-phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable because the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	Not applicable – no new wells are to be developed.	Not applicable	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the operational strategies elements will probably not prove to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable – the operational strategies elements will not prove to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – implementation of the operational strategies are not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The implementation of operational strategies may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San Diego County Environmental Health Department	Not applicable –no new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the implementation of the operational strategies will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

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

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short-term loss of SONGS generation during the plant outage to implement the operational strategies.	The operational strategies will not result in any significant changes to plant efficiency, so no significant changes in overall air quality impacts are expected during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from commuting traffic during associated plant outages.	Small Negative	None
Surface Water	No surface water impacts during construction either supplemental consumptive uses or storm water-related impacts.	The strategies will not alter the water withdrawal intake rate or cooling water discharge rate.	Not applicable	None	None
Groundwater	No additional groundwater resources will be available.	No additional groundwater resources will be available.	Not applicable	None	None
Waste	Constructions-related waste will be generated during the outage to implement these strategies. Most of these wastes will be recyclable metal that will not impact offsite disposal facilities.	There may be a minor increase in waste generation during operation if the screen improvement option in the suite of operational strategies is used.	Insignificant temporary increase in construction wastes and some metal recyclables.	Small Negative	None
Noise	Noise levels from construction will be largely unchanged, since the primary work areas will be limited to inshore or nearshore areas that house existing equipment.	Operational noise levels are expected to be largely unchanged as a result any of the operational strategies.	None	None	None
Land Use	Related construction activities are largely confined to previously disturbance onshore land and subaqueous land.	Implementation of the strategies primarily impact areas with existing marine-based equipment, so there are no permanent changes in land use.	None	None	None

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

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

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

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the operational strategies. Related impacts to housing and property are limited in that most local housing and Camp Pendleton property – is not subject to sale to the public.	Employment Levels (pending later phase)	Small Positive	None

Notes: Levels of Impact Significance

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

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering 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 substrate filtering intake system does not constitute major federal action (new 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 system should not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Installation of the substrate filtering intake system, via either cut–and-fill processes or tunneling, will generate significant impacts to waters of U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the installation of the substrate filtering intake system will generate significant impacts to waters of U.S. that cannot be addressed by the nationwide permitting process.	Not applicable	No	No
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the substrate filtering intake system poses significant impacts marine habitat and aquatic life and may also serve to further reduce operational entrainment losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable – the addition of the addition of the substrate filtering intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering 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	Not applicable – the addition of the substrate filtering intake system will not demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by Department of Navy lease arrangement with SONGS. The addition of the substrate filtering intake system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process trigger development of a comprehensive EIR. Following finalization of the requisite Environmental Impact Report, the Lead Agency will need to certify CEQA compliance. The CPUC will use this to support their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.	~12 months	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the substrate filtering intake will not result in a net power capacity (increase) >50 MW, the threshold for CEC.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable because of the considerable offshore and nearshore development within the coastal zone While there are no specific fatal flaws with the substrate filtering intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California State Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the substrate filtering intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Permit to Construct – San Diego Regional Air Pollution Control District	Not applicable – the substrate filtering intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTC) – San Diego Air Pollution Control District	Not applicable – the substrate filtering 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 substrate filtering intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the substrate filtering intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – construction of the substrate filtering intake system is expected to disturb little or no onshore areas, so there is little potential to generate significant dust emissions. The substrate filtering intake system itself will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit. – Regional Water Quality Control Board and State Water Resources Board	The substrate filtering intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – construction of the substrate filtering intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – construction of the substrate filtering intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the substrate filtering intake system.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984–California Department of Fish & Game	The installation of the substrate filtering intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the substrate filtering intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the substrate filtering intake system will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the substrate filtering 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 substrate filtering intake system could potentially require an ID number to support management or construction wastes, unless current SONGS ID will be used.	1–2 weeks	No	No

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation. - Department of Toxic Substance Control, USEPA, San Diego County Department of Environmental Health – California Unified Program Agency	Not applicable – the addition of the substrate filtering intake system will allow for the continuing use of the existing hazardous waste ID number. There will be no impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the substrate filtering intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit – San Diego County Department of Environmental Health – California Unified Program Agency and State Water Resources Board	Not applicable – the addition of the substrate filtering intake system is not expected to require 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 substrate filtering intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 – San Diego County Department of Environmental Health - California Unified Program Agency and USEPA	Not applicable – the addition of the substrate filtering intake system is not expected to require any new chemicals to be stored in quantities that exceed applicable thresholds (for example, 10,000 lb for hazardous chemicals, 500 lb for extremely hazardous chemicals).	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State 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 (USMC Camp Pendleton property) and the offshore subaqueous lands are the responsibility of the California State Lands Commission.	Not applicable	NA	NA

Table SWS-1.
Environmental Permit/Approval Assessment: Substrate Filtering Intake System
San Onofre Nuclear Generating Station *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
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 substrate filtering intake components and associated piping are not expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable – the substrate filtering intake components and associated piping are not expected to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – the installation of the substrate filtering intake system is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The addition of substrate filtering intake system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San 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 substrate filtering intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table SWS-2. Offsetting Impacts for the Substrate Filter 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, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gas emissions from replacement fossil-fuel generation to offset the short term loss of SONGS generation during the plant outage to install the substrate system.	While the substrate filtering system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands. Cut–and-fill installation practices will be more disruptive than the tunneling option.	Operational cooling water withdrawal and discharge rates will remain largely unchanged.	Significant impacts to surface water quality in impacted subaqueous areas.	Large Negative – cut and fill Moderate Negative – tunneling	None
Groundwater	No additional groundwater resources will be available.	No additional groundwater resources will be available.	N/A	None	None
Waste	A significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	Potential increase in waste generation is expected from maintenance activities on the substrate filtering system (seabed clearing operations).	Marine Spoil Wastes (pending subsequent phase of assessment)	Moderate Negative	Moderate Negative

Table SWS-2. Offsetting Impacts for the Substrate Filter Intake System 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 substrate filtering 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 substrate filtering system piping represent a change in land use of the marine bed, but it will probably not pose any impacts to water borne activities.	Work schedule (pending subsequent assessment)	Moderate 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). These impacts will be more significant for the cut and fill installation option, then for the tunneling option.	Further reduces impingement and entrainment impacts (deeper, less biological active zone) that are already partially mitigated. Overall water withdrawal or discharge rates are unchanged so thermal discharge impacts to aquatic life will remain largely unchanged	Disturbed area (pending subsequent assessment) Significant reduction in impingement and entrainment	Large Negative – cut and fill Moderate Negative – tunneling	Large Positive
Terrestrial Ecological Resources	Since construction will be mostly offshore, there is no potential to disturb land-based natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	None	None

Table SWS-2. Offsetting Impacts for the Substrate Filter Intake System San Onofre Nuclear Generating Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Since construction will be mostly offshore, there is little or no potential to discover and/or impact new cultural or paleontological resources.	No permanent loss of cultural or paleontological resources.	Not applicable	None	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The substrate filtering system will be submerged and present no permanent change in external profile of the facility.	Not applicable	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	substrate system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce and Level of Service (pending subsequent phase of assessment)	Small Negative	None
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the substrate filtering system. Related impacts to housing and property are limited in that most local housing Camp Pendleton property – not subject to sale to the public.	Workforce (pending subsequent phase of assessment)	Small Positive	None

Notes: Levels of Impact Significance

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

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

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

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
National Environmental Policy Act – Bureau of Land Management or Other Responsible Lead Federal Agency (Record of Decision, Right of Way)	Not applicable – the addition of the variable speed cooling water pump system does not constitute major federal action (new 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 variable speed cooling water pump system will not demand any additional land, nor involve any exterior changes to existing structures.	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers	Not applicable – the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers & Regional Water Quality Control Board	Not applicable – the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable – the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable – the addition of the variable speed cooling water pump system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA

Notice of Proposed Construction or Alteration – Federal Aviation Administration	Not applicable – the addition of the variable speed cooling water pump system will not result in any exterior changes to existing structures.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Notice of Proposed Construction or Alteration – FAA	Not applicable – the addition of the variable speed cooling water pump system will not demand the services of a crane or other construction equipment in excess of 200 feet above ground level.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management or Other Responsible Federal Agency	Not applicable – superseded by Department of Navy lease arrangement with SONGS. The addition of the variable speed cooling water pump system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA
California Public Utilities Commission Approval	While the CPUC will not be the lead agency for the CEQA compliance, their funding review process will follow the CEQA review process. The CEQA review process could include preparation of an *Initial Study*, followed either by a *Negative Declaration* or a *Mitigated Negative Declaration*. This decision would support the process to determine if SCE can recover the costs associated with the variable speed cooling water pump system.	6 - 9 months nominally	Potential	No
California Energy Commission – Final Decision	Not applicable – the addition of the variable speed pump will not result in a net power capacity (increase) >50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit – California Coastal Commission/Local Coastal Programs	Not applicable – the variable speed cooling water pump system will not demand any additional land, nor involve any exterior changes to existing structures in the Coastal Zone.	Not applicable	NA	NA
Coastal Development Lease – California States Lands Commission	Not applicable – the variable speed cooling water pump system will not involve any work in the marine environment.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Regional Pollution Control District Permit to Construct (ATC, Authority to Construct) – San Diego Regional Air Pollution Control District	Not applicable – the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTC, Permit to Operate) – San Diego Air Pollution Control District	Not applicable – the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Title V Federal Operating Permit – Sand Diego Air Pollution Control District and USEPA	Not applicable – the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit – USEPA	Not applicable – the variable speed cooling water pump system will not generate any additional air emissions.	Not applicable	NA	NA
Dust Control Plan – San Diego Air Pollution Control District	Not applicable – construction of the variable speed cooling water pump system is not expected to disturb ground surfaces and so is not expected to generate any significant supplemental dust emissions. The pumping system will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Regional Water Quality Control Board and State Water Resources Board	While the variable speed cooling water pumping system will likely provide more operational flexibility regarding water withdrawal rates, it will not change the peak water withdrawal rates, nor change the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board	Not applicable – construction of the variable speed cooling water pump system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board	Not applicable – construction of the variable speed cooling water pump system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Notice of Intent – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the variable speed cooling water pump system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Water Quality Control Board	Not applicable – SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 – California Fish and Game Department	Not applicable – the addition of the variable speed cooling water pump water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement – California Department of Fish & Game	Not applicable – the addition of the variable speed cooling water pump will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements – San Diego Regional Water Quality Control Board	Not applicable – the addition of the variable speed cooling water pump will not result in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation	Not applicable – the variable speed cooling water pump system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station (cont.)

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

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Emergency Planning and Community Right-to-Know Act – 40 CFR 311 & 312 - San Diego County Department of Environmental Health – California Unified Program Agency and USEPA	Not applicable – the addition of the pumping system is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (for example, 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Condition Use Plan Amendment – San Diego County Department of Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Grading Plan Approval or Permit – San Diego County Department of Public Works & Planning and Land Use	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) – San Diego County Department of Public Works	Not applicable – similar to the construction-phase SWPPP. No separate submittal is expected to be directed to the county, since the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Diego County Building Division	Not applicable – the SONGS property is entirely situated on federal property (USMC Camp Pendleton property).	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) – San Diego County Department of Environmental Health	Not applicable – no new potable water systems are planned.	Not applicable	NA	NA
San Diego County Well Water Permit – San Diego County Department of Environmental Health	Not applicable – no new wells to be developed.	Not applicable	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the variable speed pump elements will probably not prove to be oversized	Not applicable	NA	NA

Table VS-1.
Environmental Permit/Approval Assessment: Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generating Station (cont.)

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path (Yes/No/NA)	Fatal Flaw (Yes/No/NA)
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable —the variable speed pump elements will probably not prove to be oversized.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable – the installation of the variable speed pumping system is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Diego County Fire Department	The addition of variable speed pump may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan	No	No
Sewer and Sewer Connections – San 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 variable speed pumps will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generation 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 pumping system.	While the variable speed pump system could result in some plant efficiency gains during lower load operating scenario, no significant changes in overall air quality impacts are expected during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from commuting traffic during associated plant outages	Small Negative	None
Surface Water	No surface water impacts during construction either supplemental consumptive uses or storm water-related impacts.	During periods of reduced power output, the variable cooling water pump system will withdraw less saltwater that ultimately contributes to local thermal impacts from the reduced cooling water discharge.	The reduction of water withdrawal volumes will offer limited reductions of the related thermal discharge impacts.	None	Small Positive
Groundwater	No additional groundwater resources will be available.	No additional groundwater resources will be available.	Not applicable	None	None
Waste	Constructions-related waste will be generated during the outage. Most of these wastes will be recyclable metal that will not impact offsite disposal facilities.	No significant increase in waste generation during operation.	Insignificant temporary increase in construction wastes and some metal recyclables	Small Negative	None

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generation Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Noise levels from construction will be largely unchanged, since the primary work areas are inside existing buildings.	Operational noise levels are expected to be largely unchanged as a result of the new pumping system.	Not applicable	None	None
Land Use	Construction activities are largely confined to previously disturbed lands and existing structures.	Pumping system resides in existing structures, so there are no permanent changes in land use.	Not applicable	NAS	NAS
Marine Ecological Resources	No new marine-based construction will be needed to install the variable speed pumping system.	During periods of reduced power output, the variable cooling water pump system will withdraw less saltwater resulting in a parallel and equivalent reduction of impingement and entrainment impacts and a coincident reduction of local thermal impacts from the reduced cooling water discharge.	The reduction of water withdrawal volumes will offer limited reductions of marine source impacts	None	Small Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	None	None
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of cultural or paleontological resources.	Not applicable	None	None
Visual Resources	All construction equipment will be low profile, that is, not extend above the height of local facility structures.	The variable cooling water pump system will be contained within an existing building and will present no permanent change in external profile of the facility.	Not applicable	None	None

Table VS-2.
Offsetting Impacts for the Variable Speed Cooling Water Pump Systems
San Onofre Nuclear Generation Station *(cont.)*

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The new pumping system will not significantly alter the current number of plant deliveries or operating personnel.	Level of Service Impacts (pending later phase)	Small Negative	None
Socioeconomic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (for example, housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the new pumping system. Related impacts to housing and property are limited in that most local housing Camp Pendleton property – not subject to sale to the public.	Employment Levels (pending later phase)	Small Positive	None

Notes: Levels of Impact Significance

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