



Prepared for



and the
State Water Resources Control Board
Nuclear Review Committee

Independent Third-Party
Interim Technical Assessment

for the
**Variable Speed Cooling Water Pumping Systems
for San Onofre Nuclear Generating Station**

Prepared by



Bechtel Power Corporation

Study No. 25761-000-30R-G01G-00001

July 10, 2012

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List of Abbreviations and Acronyms

BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CDFG	California Department of Fish & Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFGD	California Fish and Game Department
CPUC	California Public Utility Commission
CWA	Clean Water Act
EPCRA	Emergency Planning and Community Right-To-Know Act
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
fps	foot per second
GWA	Government of Western Australia
IS	Initial Study
mgd	million gallons a day
MND	Mitigated Negative Declaration
ND	Negative Declaration
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
OHP	Office of Historic Preservation
RC	Resource Commission
RCRA	Resource Conservation Recovery Act
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SDRWQCB	San Diego Regional Water Quality Control Board
SONGS	San Onofre Nuclear Generating Station
SPCC	Spill Prevention and Countermeasure Control Program
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USACE	U.S. Army Corp of Engineers
USEPA	U.S. Environmental Protection Agency
WDR	Waste Discharge Requirement



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1. Executive Summary

This study summarizes the findings of the first phase of a detailed evaluation to assess viability of the variable speed pump technology cooling system option to once-through cooling for the San Onofre Nuclear Power Station (SONGS), which supports the Nuclear Review Committee’s initiative to identify strategies to implement the State Water Resources Control Board’s (SWRCB’s) *Statewide Water Quality Control Policy on the Use of Coastal and Estuarine Water for Power Plant Cooling* (Enercon, 2012), that is strategies that comply with the Section 316b California Once-Through-Cooling Phase II rules.

This initial assessment focuses on two primary factors—the required cooling water withdrawal rates and the cooling water intake temperature. SONGS is a base-loaded power plant, which is designed to operate at full capacity, except during periods of maintenance, repair, and refueling. Some marine resource benefits could be realized by reducing load generation (and ocean water withdrawal rates) during off-peak seasons when power demand is lower. However, it is not expected that the off-peak season load reduction and the corresponding reduction in entrainment loss and impingement mortality from variable speed pumps operation alone will reach a level commensurate with that of a closed-cycle wet cooling system.

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

In addition to these factors, external approval and permit assessment and environmental offset assessment was also conducted for variable speed pump technology. The external approval and permitting assessment identified a rather short list of potentially applicable federal, state, and local permits and approvals that, not unexpectedly, failed to produce a fatal flaw or any lengthy review and approval processes. The environmental offset evaluations offered evidence this technology option is a largely benign technology, which may offer a weak net-positive environmental benefit.

The clear conclusions regarding the expected marginal reductions of impingement and entrainment impacts from this technology preclude the need to evaluate other criteria because, to meet the through-screen velocity target of 0.5 fps, 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. Finally, an EPRI study (EPRI 2007) concludes that such reduction in load may have significant impacts to the electric generation supply to the grid when most needed.

Thus, the variable speed pump technology, when employed solely as the best technology available, cannot satisfy the requirements of the 316(b) California Once-Through Cooling Policy Phase II rules in a meaningful way. Consequently, this cooling system technology option is not offered as a candidate for further investigation in Phase II of this study.

2. Background And Introduction

2.1 Purpose/Scope of Study

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

2.2 Regulatory History

2.2.1 Federal

The U.S. EPA has proposed standards to meet its obligations under Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. More specifically, this section requires that National Pollutant Discharge Elimination System (NPDES) permits for facilities with cooling water intake structures ensure that the location, design, construction, and capacity of the structures reflect the best technology available to minimize the harmful impacts on the environment. These impacts are associated with the significant withdrawal of cooling water by industrial facilities, which removes from or otherwise impacts significant quantities of aquatic organisms 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 (U.S. EPA, 2011).

In response to a consent decree with environmental organizations, the U.S. Environmental Protection Agency (EPA) divided the Section 316(b) rules into three phases. Most new facilities (including power plants) are addressed in the Phase I rules, initially promulgated in December 2001. Existing power plants are subsequently addressed, along with other industrial facilities, in the Phase II version of the rules, issued in Febru-

ary 2004. Since then, the rules have been challenged, remanded, suspended, and repropoed. The current proposed version of the rule (USEPA, 2011) dictates that all existing facilities that withdraw more than 2 million gallons per day (mgd) of water from waters of the U.S. and use at least 25 percent of the water they withdraw exclusively for cooling purposes would be subject to:

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

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

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

2.2.2 State

The SWRCB is responsible for ensuring compliance with the finalized Section 316(b) rules in California, and it has been actively pursuing a parallel path regulatory program that is focused on the state's coastal generating stations with once-through cooling systems including SONGS. The SWRCB's once-through cooling policy became effective October 2, 2010. This policy established statewide technology-based requirements to significantly reduce the adverse impacts to aquatic life from once-through cooling. Closed-cycle wet cooling has been selected as the best technology available.

Affected facilities, including SONGS, are expected to:

- Reduce intake flow to a level commensurate with that attainable with a closed-cycle wet cooling system and reduce through-screen velocity to 0.5 fps or below—Track 1, or
- Reduce impacts to aquatic life comparably by other means—Track 2

This policy is being implemented through an “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 both SONGS and Diablo Canyon 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).

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

SONGS operates two independent cooling water intake structures to provide cooling water to the once-through circulating water system for Unit 2 and Unit 3. Each unit's design water withdrawal rate is approxi-

mately 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. The traveling water screens' through screen velocity is 3 fps (SCE 2008). Screens are rotated based on the pressure differential between the upstream and downstream faces, or they can be rotated manually. A high-pressure spray removes any debris or fish that have become impinged on the screen face. The vertical traveling screens are angled at approximately 30° to incoming flow. This feature, combined with a series of vertical louvers placed in the forebay, guides the fish to a quiet zone at the end of the cooling water intake 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 1,900 feet offshore (Tetra Tech, 2008). Also housed in the cooling water intake structure of each unit are four saltwater cooling pumps, each rated 17,000 gpm. These pumps are safety-related and located downstream of the traveling water screens. Operation of one pump is sufficient to supply the saltwater cooling needs for one unit. The total saltwater cooling flow needs for both units is 34,000 gpm. (SONGS, 2004).

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

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

2.3 Screening Process (A/B Criteria)

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

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

- External approval and permitting (non-nuclear licensing)
- Impingement/entrainment design
- Environmental Offsets

All remaining criteria are grouped into Set B criteria, which consist of :

- First-of a-kind to scale
- Operability of general site conditions
- Seismic and tsunami issues
- Structure

- Construction
- Maintenance

During the screening process, if any criterion is deemed unacceptable, the screening process is suspended, and a summary report for that technology is then prepared.

3. Technology Description

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 that is 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 base-load 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 316(b) California Once-Through Cooling Policy Phase II rules, the range of flow reduction most current large-capacity variable speed pumps can achieve is on the order of 15 to 30 percent.

According to published studies on the subject, 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. 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 intake structure or the lower impingement velocity associated with 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 to the safe operation of the intake.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 General Discussion

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of a variable speed cooling water pumping system.

The initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable). This applicability of each permit/approval to the proposed variable speed pump option was evaluated. Those permits and approvals which were deemed applicable were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria 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 variable speed cooling water pumping system from further consideration.

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

Permits and approvals that support later stages of construction and operation that are not critical path to the start of construction were also included in the assessment since these items could pose significant operational constraints to future SONGS operations.

4.1.2 Detailed Evaluation

This summary list of permits provided the basis for subsequent discussions with key relevant regulatory authorities regarding the applicable permit application needs and the permit review time frames. These discussions were also critical for the identification of potential regulatory or permit-related barriers to implementation - fatal flaws.

The following regulatory authorities were contacted:

- U.S. Army Corps of Engineers (USACE)
- U.S. Marine Corps – Camp Pendleton
- California Public Utility Commission
- California Coastal Commission
- California State Lands Commission
- State Water Resources Control Board (SWRCB)
- San Diego Regional Water Quality Control Board (SDRWQCB)
- 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 variable speed pump technology and summarize these findings in Table 1, which lists the applicable permits and approvals, determines the critical path review processes, and most importantly, highlights those processes that may be fatally flawed.

4.1.2.1 Variable Speed Cooling Water Pumping System

The variable speed pumping system will be designed to automatically adjust to seasonal flow demand variations and other influences to meet plant needs. The construction efforts to install the variable speed pumping system will be limited. This effort will not involve additional permanent or temporary land use because the construction efforts will be confined to areas internal to the existing buildings and in other developed areas of the SONGS facility. There will be no additional temporary or permanent structures associated with this cool-

ing system technology. The associated construction work force will use SONGS existing parking and delivery facilities. The existing offshore saltwater intake system will be used without modification, so there is no marine work envisioned for the variable speed cooling water pumping system.

U.S. Army Corps of Engineers

The USACE is the lead agency for Clean Water Act Section 404 and Section 10 permitting processes, which are focused primarily on impacts to waters of the U.S. and waterborne navigation. The variable speed cooling water pump system is not expected to pose any construction impacts to USACE jurisdictional waters.

Consequently, this option is not expected to demand the USACE general permit program (Nationwide Permit) or the more complex individual Section 404/10 permit. The potentially lengthy permit review process associated with the individual form of the permit is not a concern (Lambert, 2012).

U.S. Marine Corps – Camp Pendleton

SONGS is located on leased property that is part of the Marine Corps Camp Pendleton. Any significant physical improvements to the SONGS facility, such as the addition of closed cooling systems, are potentially subject to a formal review and approval process by the U.S. Marine Corps 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 Marine Corps and the Department of the Navy authority to review and improve physical improvements on the subject property (Rannals, 2012). While this authority does not formally extend to offshore properties, the Marine Corps is also interested in offshore work in the area, since it could potentially impact their offshore training activities.

The variable speed cooling water system will not demand any additional federal land. The associated construction effort will be largely confined to interior spaces of existing buildings. Consequently, this option is not expected to require any modification of current SONGS lease arrangement with the Department of the Navy.

California Public Utility Commission

SCE's SONGS is regulated by the California Public Utility Commission, which is charged with overseeing investor-owned public utilities. Given the lack of significant county involvement on this federal property, the California Public Utility Commission will likely be designated the Lead Agency for the California Environmental Quality Act (CEQA) review process. CEQA is a regulatory statute that requires state or local regulatory agencies to identify, assess, avoid, or otherwise mitigate the significant environmental impacts from the proposed action – the addition of new cooling system technology.

The proposed variable speed cooling system pump will likely not trigger preparation of an environmental impact report. Instead, the CEQA review process will follow the abbreviated process that could include development of an *Initial Study*, followed either by a *Negative Declaration*, which is indicative of no adverse environmental impacts, or a *Mitigated Negative Declaration*, which follows mitigation of relatively minor negative impacts. This decision, along with other financial information, would ultimately support the process to determine if SCE can recover the costs associated with this cooling system technology.

While the California Public Utility Commission-sponsored environmental review process will be mostly a perfunctory affair, the follow-on decision process regarding cost recovery will be more involved and poten-

tially contentious. Consequently, there are no clear environmental barriers that preclude completion of the CEQA review.

California Coastal Commission

The California Coastal Commission has a broad mandate to protect the coastal resources of California, which includes the entire SONGS facility. Consequently, the Commission'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). Despite this comprehensive focus, the Commission has little in the way of specific, objective criteria that could be used to effectively screen any of the cooling technology options from further consideration.

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

The California Coastal Commission indicates that they are concerned about visual impacts in the coastal zone. The variable speed pump system would not alter the existing profile of the SONGS facility and therefore would present no visual resource concerns.

The pumping system would not involve offshore construction efforts, so the California Coastal Commission concerns regarding the deleterious impacts on marine resources (that is, hard marine substrate, commercial fishing) would not prove to be a decisive or contentious part of their review process.

The California Coastal Commission would view the reduced water withdrawals possible with the variable speed pumping system as wholly positive outcomes given the associated reduction of thermal impacts (lower effluent discharge rate) and parallel reduction of entrainment/impingement impacts. The overall weight of these positives in their balancing of environmental impacts is somewhat reduced by the fact that the Commission is not primarily charged with evaluating the cooling system's compliance with Section 316(b) Phase II criteria or NPDES thermal discharge considerations.

The California Coastal Commission review and approval process is somewhat bound by the California Environmental Quality Act (CEQA) review process. That is, any application for a coastal development permit depends on information that comes out of the California Environmental Quality Act-driven environmental impact report process. Given the expected abbreviated CEQA process for this cooling system, the Commission review process will not be a contentious or 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:

- **Categorical Exemption** – applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use.
- **Mitigated Negative Declaration** - applicable for work that poses minor environmental impacts, during noncritical seasons, for limited 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 period (months). This review process is not fast-track and could extend for a year.

The variable speed cooling water pump system is not expected to require revisions of the current cooling system infrastructure situated on subaqueous lands. Therefore, concerns from the California State Lands Commission representatives (DeLeon & Oggins, 2012) regarding the slow progress regarding recent lease approval processes for nonnuclear facility with once-through cooling systems may not be applicable. However, this assumes that the current leasing arrangement at SONGS remains in force to support the new variable speed cooling water pump system. Most of the nonnuclear facilities have requested extensions to continue to evaluate available mitigation strategies.

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

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

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

The reduced water withdrawal rates associated with this option will occur in response to changes in ambient conditions and regional power demands. Reduced cooling water needs will be associated with a parallel improvement in impingement and entrapment. This variable speed cooling water pump system may require the current SONGS NPDES permit to be revised to address the expected changes to the cooling system discharge quantity and provisions of Section 316(b) Phase II 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.

Both the SWRCB and SDRWQCB representatives (Jauregui, 2012 and Morris, 2012) explained that there are no obvious regulatory barriers regarding issuance of a revised NPDES permit for any of the cooling system options currently under consideration, including the variable speed cooling water pump system. The SDRWQCB and SWRCB will not necessarily preclude cooling system options from consideration, even if these options fall short of full compliance with the performance criteria tied to Section 316(b) Phase II rules (i.e., through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed cooling cycle system). The variable speed cooling water pump system entrainment and impingement performance will fall well short of closed cooling cycle attributes.

The State Water Resources Control Board is ultimately a political body (9 members), interested in reviewing as much information/evidence from the applicant and their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process to the variable speed cooling water pump system.

San Diego Air Pollution Control District

SONGS is located within the San Diego Air Pollution Control District, a state-designated, non-attainment area for PM-10 and PM-2.5, that is, the District has failed to achieve compliance with the state ambient air quality standards for these pollutants (Annicchiarico, 2012). In addition to this air quality compliance issue, there are also local concerns regarding visibility impacts on the nearest visibility sensitive areas, so-called Class I areas that are comprised of national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence as of August 1977. While these situations may have ramifications for those cooling system options that generate significant particulate emissions (closed cooling cycle systems), air quality permits/approvals are not expected to play an appreciable role for the variable speed cooling water pump system – a system that will not generate any additional operational air emissions.

San Diego County Department of Environmental Health

Because SONGS is located entirely on leased federal property that is part of the Marine Corps 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 U.S. Marine Corps and U.S. Department of the Navy. Consequently, most of the San Diego County Department of Planning and Land Use, Public Works, and Building Division.

San Diego County's regulatory responsibilities regarding SONGS are limited by the fact that the facility is entirely situated on federal land, that is, the U.S. Marine Corps Base, Camp Pendleton. Consequently, most of the county regulatory departments (for example, County Planning, 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 (Mache, 2012). The County Environmental Health Department has received CalEPA approval to be the Certified Unified Program Agency responsible for managing the following programs:

- California Aboveground Storage Tank Program – mandates development and implementation of a Spill Prevention and Countermeasure Control Program 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 responsibilities.

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

Other Regulatory Agencies

In addition to the key regulatory agencies described above, there are a number of regulatory agencies that could potentially play a role in the permitting of the various cooling system technology options. The U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. The variable speed cooling water pump system, however, entails little or no new land disturbance that would impact sensitive biological or cultural resources.

Installation of the pumping system within existing buildings in the SONGS Coastal Complex will not alter the overall profile of the SONGS facility and certainly not require significantly tall or large construction equipment. These considerations will preclude significant interactions with California Department of Transportation - Caltrans (roadway crossings, encroachments, oversized vehicles) and the Federal Aviation Administration whose focus would be limited to aviation obstruction impacts posed by tall new permanent or temporary features (> 200 feet agl).

Finally, the California Energy Commission will be largely excluded from the permitting processes primarily because variable cooling water pump systems will not boost currently power levels of the SONGS facility, let alone reach the 50 MW threshold, which would mandate California Energy Commission review.

4.1.2.2 Summary

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

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

The assessment also indicated that the California Public Utility Commission-sponsored 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. Obviously, the duration of this critical path process does not represent a barrier to developing this cooling technology system.

4.2 Impingement/Entrainment Design

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 316(b) California Once-Through Cooling Policy Phase II rules. As stated in Section 3, the two main factors that will influence the required cooling water flow are the plant load generation and the intake water temperature. (Raising the temperature rise across the condensers is not considered a viable alternative to 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 about 53°F to about 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 impingement and entrainment improvement 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 to the electric generation supply to the grid when most needed.

Because of its potential marginal improvements on impingement and entrainment impacts, the variable speed pump technology, when used alone, is deemed inadequate in meeting the requirements of the 316(b) California Once-Through Cooling Policy Phase II rules.

4.3 Environmental Offsets

4.3.1 General Discussion

The environmental offsets are an environmental management tool that has been characterized as the “last line of defense” after attempts to mitigate the environmental impacts of an activity are considered and exhausted (GWA, 2006). In some cases, significant unavoidable adverse environmental impacts may be able to 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 not 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 Air Pollution Control District, 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 Air Pollution Control District 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 variable speed cooling water pump system from a broad range of environmental evaluation criteria.

4.3.2 Detailed Discussion

The following sections evaluate the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic issues associated with construction and operation of the variable speed cooling water pump system. Given the wide range of environmental impact subject areas under consideration, the systematic approach used in the Diablo Canyon License Renewable Application process was used (PG&E, 2009). Consequently, the 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 from not detectable or minor such that they will not noticeably alter any important attribute of the resource
- **Moderate:** Environmental effects are sufficient to noticeably alter, but not significantly change the attributes of the resource.
- **Large:** Environmental effects are clearly noticeable and are sufficient to change the attributes of the resource.

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



Air

The air quality impacts associated with installation of the variable speed cooling water pumping system are small given that the limited nature of the associated construction activities. There will be little or no opportunity to generate fugitive dust from land disturbance activities, as the primary activity will involve replacement of a pump system within an existing building. Some additional vehicle-related air emissions can be expected from the small number of outage workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment will be unnecessary. Construction supplies and pumping equipment deliveries will be minimal. Most of the remaining construction equipment inventory will use existing onsite electrical power, avoiding the need for diesel powered equipment.

Because the variable pumping system may actually serve to reduce internal plant power demands, this system will not derate SONGS overall plant efficiency and therefore will not encourage the generation of additional greenhouse gas emissions from replacement fossil power sources.

Surface Water

Given the limited nature of the construction needed to install the variable speed cooling water pumping system, no significant additional surface water resources will be needed and there will be little or no new land disturbance that could potentially generate storm water impacts.

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

Groundwater

Given the limited nature of the construction needed to install the variable speed cooling water pumping system, no significant additional groundwater resources will be needed.

The variable speed cooling water pump systems are not expected to require any additional groundwater resources.

Waste

Constructions-related waste, including recyclable metals from the previous cooling water pumping system, will be generated during the outage. Consequently, most of the construction wastes 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.

Noise

Previous studies have concluded from consultations with the County of San Diego County, City of San Clemente, and Camp Pendleton, that noise levels are expected not to exceed 70 dBA at the nearest public receptor (Tetra Tech). 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 as a result of the new pumping system.

Land Use

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

The new pumping system will reside wholly within existing structures, so there are no permanent changes in land use.

Marine Ecological Resources

Construction activities associated with the variable speed cooling water pump system are confined to the previously developed land areas. There will be 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 based load condition.

Terrestrial Ecological Resources

Construction activities associated with the variable speed cooling water pump system are confined to the previously developed land areas. There will be no construction impacts to natural habitat areas or areas with significant ecological value or sensitivity. Operation of the variable speed pumping system will similarly present no threat to these resource areas.

Cultural and Paleontological Resources

Because installation of the variable speed pump system will be confined to previously disturbed land, there is little or no potential to discover new cultural or paleontological resources in these developed areas. Operation of this system will similarly pose no 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 variable cooling water pump system will be contained within an existing building and will present no permanent change in external profile of the facility.

Transportation

Increased commuting traffic from the construction work forces and construction deliveries could worsen the existing level of service on local roads during the plant outage. This negative traffic impact will be mitigated by the short duration of the variable speed pump construction period. If this construction activity is aligned with a large-scope plant outage activity, its incremental impact relative to other plant upgrade activities will likely make its contribution to local traffic levels negligible.

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 remain largely unchanged following in response to the new pumping system.

4.3.3 Summary

Table 2 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the variable speed cooling water pump system. The construction impacts 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 to Scale

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

4.5 Operability of General Site Conditions

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

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 Structure

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

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

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

As described in Section 4.2, 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 316(b) California Once-Through Cooling Policy Phase II rules. Marginal improvement, up to 20 percent based on optimistic estimates with very conservative assumptions, may be attainable during winter and spring months because of the colder seawater temperature in conjunction with lower power 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 details in Sections 4.1 and 4.3.

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.

6. Appendices

6.1 Input Data

The input data cited in this report are from the references listed in Section 6.2.

6.2 References

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- SONGS, 2008. Circulating Water System, System Description, Rev. 14
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6.3 Sketches

No sketches are applicable for this technology report.

Table 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 (federal land, funding).	Not applicable	NA	NA
Department of Navy and United States Marine Corp – 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 (USACE)	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 Corp of Engineers (USACE) & Regional Quality Control Board (RWQCB)	Not applicable — the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Nationwide Permit – U.S. Army Corps of Engineers	Not applicable — the addition of a variable speed cooling water pump system will not generate any impacts to waters of U.S. (wetland impacts and discharges of dredge or fill material into waters), nor involve work in navigable waters.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Not applicable — the addition of the variable speed cooling water pump water system will not impact marine or terrestrial habitat areas.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA)	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 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 water system will 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 (BLM) 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 Utility Commission (CPUC) Approval	CPUC will likely be the lead agency for the California Environmental Policy Act (CEQA) review process regarding the proposed variable speed cooling water pump system. The CEQA review process could include preparation of an Initial Study (IS), followed either by a Negative Declaration (ND) or a Mitigated Negative Declaration (MND). 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 (CEC) – 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
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

Table 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 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 – San 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 (RWQCB) 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 (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, San Diego Regional Water Quality Control Board (RWQCB)	Not applicable — construction of the variable speed cooling water pump system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – San Diego Regional Water Quality Control Board (RWQCB)	Not applicable — construction of the 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 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 Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, San Diego Regional Water Quality Control Board (RWQCB)	Not applicable — SONGS NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the variable speed cooling water pump system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Regional Quality Control Board (RWQCB)	Not applicable — SONGS NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Fish and Game Department (CFGD)	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 (CDFG)	Not applicable — the addition of the variable speed cooling water pump will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements (WDR) – San Diego Regional Water Quality Control Board	Not applicable — the addition of the variable speed cooling water pump will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation (OHP)	Not applicable — the variable speed cooling water pump system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA

Table 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 Recovery Act (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 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 Recovery Act (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 pumping system will allow for the continuing use of the existing hazardous waste identification number. There will be not impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Diego County Department of Environmental Health - California Unified Program Agency and 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 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 pumping system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA

Table 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 (EPCRA) – 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 (e.g., 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval – San Diego County Department of Planning and Land Use	Not applicable — the SONGS property is entirely situated on federal property (U.S. Marine Corps 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 (U.S. Marine Corps 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 (U.S. Marine Corps 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 (U.S. Marine Corps 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 (U.S. Marine Corps 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 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 — while local municipality rules may supersede this regional land use/watershed protection related project approval process, this is not the case for SONGS.	Not applicable	NA	NA
Resource Conservation (RC) Land Use Management Approval	Not applicable — while local municipality rules may supersede this regional land use/watershed protection related project approval process, this is not the case for SONGS.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Diego County Public Works Department	Not applicable — 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 2.
Offsetting Impacts for the Variable Speed Cooling Water Pump
San Onofre Nuclear Generation Station

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	<p>Minor increase in greenhouse gases, NO_x, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce.</p> <p>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.</p>	<p>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.</p>	<p>Insignificant temporary increase in CO₂ greenhouse gas emissions from commuting traffic during associated plant outages</p>	Small Negative	None
Surface Water	<p>No surface water impacts during construction either supplemental consumptive uses or storm water-related impacts.</p>	<p>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.</p>	Not applicable	None	Small Positive
Groundwater	<p>No additional groundwater resources will be needed to support construction.</p>	<p>No additional groundwater resources will be needed to support operations.</p>	Not applicable	None	None
Waste	<p>Constructions-related waste will be generated during the outage. Most of these wastes will be recyclable metal that will not impact offsite disposal facilities.</p>	<p>No significant increase in waste generation during operation.</p>	<p>Insignificant temporary increase in construction wastes and some metal recyclables</p>	Small Negative	None

Table 2.
Offsetting Impacts for the Variable Speed Cooling Water Pump
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	None	None
Marine Ecological Resources	No new marine-based construction will be needed to install the variable speed pumping system.	During periods of reduced power output, the variable cooling water pump system will withdraw less saltwater resulting in a parallel and equivalent reduction of impingement and entrainment impacts and a coincident reduction of local thermal impacts from the reduced cooling water discharge.	Not applicable	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, i.e., 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 2.
Offsetting Impacts for the Variable Speed Cooling Water Pump
San Onofre Nuclear Generation Station (cont.)

Category	Impacts – Construction	Impacts – Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Transportation	Increased traffic from the construction work force 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 (e.g., housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the new pumping system.	Employment Levels (pending later phase)	Small Positive	None

Notes: Levels of Impact of Significance

Small: Environmental effects from not detectable or minor such they will not noticeably alter any important attribute of the resource

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

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