IMPLEMENTATION PLAN
STATEWIDE POLICY
USE OF COASTAL AND ESTUARINE WATERS
POWER PLANT COOLING
(California Water Code Section 13383
Resolution No. 2010-0020)

AES REDONDO BEACH GENERATING STATION
AES SOUTHLAND, LLC

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1.0 INTRODUCTION

In accordance with the May 4, 2010, State Water Resources Control Board's (SWRCB's) Resolution No. 2010-0020 (Resolution) and adoption of a Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (OTC Plan), AES Southland, LLC (AES-SL) hereby submits this Implementation Plan to comply with California's Once-Through-Cooling (OTC) policy (OTC Policy) at its Redondo Beach Generating Station (RBGS). Specifically, this Implementation Plan provides the information requested in the SWRCB's letter to AES-SL dated November 30, 2010.

AES-SL owns and operates approximately 4,200 megawatts (MW) of OTC-based generation located at three generating stations (Redondo Beach, four units; Huntington Beach, four units; and Alamitos, six units). These three facilities represent approximately 18 percent of Southern California Edison's (SCE's) peak demand, 33 percent of the total installed capacity in the Los Angeles Basin Local Capacity Requirements (LCR) area, and 40 percent of the California Independent System Operator's (CAISO's) projected LCR needs in 2011. To meet the requirements of the OTC Policy, support the electrical system's needs, and meet the expected Long-Term Procurement Process (LTPP) and new source solicitation timelines, AES-SL plans to implement a comprehensive, phased repowering program of its entire generation fleet. The comprehensive plan will meet the OTC Policy's Track 1 compliance option.

AES-SL's phased repowering program entails a combination of retirements and replacements with either simple-cycle or combined-cycle gas turbine technology. AES-SL has not finalized its cooling technologies but is currently considering air-cooled condensers (ACC),… **CONFIDENTIAL INFORMATION REMOVED REGARDING COOOLING TECHNOLOGIES** …, or mechanical draft cooling towers using Title 22 Reclaim water. The use of any ocean water for cooling would be consistent with Track 1 of the OTC Policy, whereby the intake flow rate is reduced by 93 percent from the intake design rate of an existing unit and the intake velocity is equal to or less than 0.5 foot per second.

Given the size of the AES-SL portfolio and expected limitations in the procurement and construction process, implementation of our preferred plan will require that compliance dates for some AES-SL units are extended past the December 31, 2020 target established in the OTC Policy. Details to support this need are provided in other sections of this Implementation Plan.

There are a number of overarching complexities and constraints that require the RBGS Implementation Plan to be an integral part of the AES-SL fleet-wide program, including the following:

- Coordination with the biennial LTPP and SCE's solicitation process, the California Public Utility Commission (CPUC) Power Purchase Agreement (PPA) approval process, and the California Energy Commission's (CEC's) licensing process
- Maintaining critical generating assets to support local and regional electrical grid requirements and system needs while the replacement units are constructed
- Air quality regulations that exempt AES-SL from supplying emission offsets on a MW-for-MW basis if the retirement and replacement is done in a contemporaneous fashion

- Available free space at each site
- Permitting, procurement, demolition, and construction timelines that are interdependent and an average of 6 years in duration for each unit replacement

Therefore, while this Implementation Plan focuses on the RBGS, it also frequently refers to the overall AES-SL plan and provides a preliminary schedule for the integrated phased retirement and repowering of all of AES-SL's units (see Table 1).

It also must be emphasized that although an AES-SL fleet-wide repowering program is our preferred compliance option, execution of the plan is entirely dependent on our ability to secure long-term PPAs to support project financing of the replacement units. To obtain these PPAs, AES-SL expects to participate in competitive solicitations that result from the LTTP proceedings and is also willing to enter into Assembly Bill (AB) 1576 cost-based PPAs with either SCE or CAISO if concerns about market power cannot be satisfied or there are other beneficial reasons for considering cost-based PPAs. If AES-SL is not able to secure PPAs, preferably with terms longer than 10 years, AES-SL will likely be permanently retiring units as of their compliance dates as opposed to retrofitting the existing facilities with alternative cooling systems.

The details of this Implementation Plan are based on the best information available at this time to meet the requirements of the OTC Policy for the RBGS. AES-SL's three generating stations provide critical capacity to the Los Angeles Basin and are an integral part of the LCR, which is currently under assessment by Balancing Area Authorities (BAA), utilities, and the interagency AB 1318 technical team led by the California Air Resources Board (CARB). As information from various state-led studies, as well as AES-SL's own studies, become available, we will submit amendments to this Implementation Plan. As such, the RBGS Implementation Plan is subject to change.

2.0 GENERAL PLAN

AES-SL will comply with Compliance Alternative Track 1 as defined in Section 2 A. (1) of the OTC Policy. At the RBGS, AES-SL intends to comply with Compliance Alternative Track 1 by constructing new combined-cycle gas turbine generation facilities at RBGS to replace the four existing units, which total approximately 1,356 MW. Given land and other constraints, the replacement units will need to be constructed in two phases with the commercial operation dates separated by approximately four years. Additional details regarding the phasing requirement are provided in Section 3.0.

The new units will provide operating flexibility to effectively integrate increasing amounts of renewable energy into the electrical transmission and distribution system. AES-SL believes the redevelopment of the existing OTC projects in the South Coast Air Basin (SCAB) will be effective in meeting California's future needs forecasted for the 2020 planning horizon within the Los Angeles Basin LCR. AES-SL continues to invest significant time and effort to understand the transmission constraints, demand requirements, and renewable energy integration of the Los Angeles Basin LCR. As part of this effort, AES-SL is actively monitoring the reliability needs assessment mandated by AB 1318 and performing its own independent studies. Recent CAISO and CPUC reports include data and information that highlight the need for more flexible generation to integrate renewable energy into the system.

These include the following:

- CPUC LTPP Scoping Memo 1 in 2 Demand Forecast
- CAISO Integration of Renewable Resources at 20 percent Renewable Portfolio Standard (RPS) Report
- CAISO 33 percent RPS Study of Operational Requirements and Market Impacts

In light of these reports and as a result of AES-SL's work, we believe that flexible, load following generation, with adequate contingency reserves, ramp speed and duration and start/stop capabilities is needed to maintain electrical system reliability and integrate the desired renewable resources.

In addition, the AES-SL's repowering program is expected to create more than 5,000 high-paying construction jobs over a 10- to 12-year period during the construction of the new units and demolition of the existing facilities.

2.1 COOLING ALTERNATIVES

All of AES-SL's repowered units and associated cooling systems will, at a minimum, provide a 93 percent reduction in intake flow rate for each unit as compared to the prior unit's intake design flow rate. Additionally, the intake through-screen velocity will not exceed 0.5 foot per second. Table 2 provides the design intake flow rate for Units 5 through 8 at the RBGS, the required 93 percent reduction, and the remaining 7 percent that is available for use.

RBGS is still in the process of evaluating its cooling options and is considering three technologies to comply with the required reduction in intake flow rates.

- ACC
- **CONFIDENTIAL INFORMATION REMOVED REGARDING COOOLING TECHNOLOGIES**
- Closed-cycle Mechanical Draft Cooling Tower (MDCT) system using reclaimed/recycled water compliant with California Code of Regulations (CCR) Title 22

Table 3 addresses the availability of CCR Title 22 reclaimed/recycled water to meet the water requirements for a closed-cycle wet cooling system for the phased repowering and retirement program at the RBGS. As indicated in the Table 3, sufficient reclaimed/recycled water is potentially available in future years. During evaluation and selection of the final cooling technologies, AES-SL will consider the tradeoffs of using reclaimed/recycled water, including infrastructure costs, operating and maintenance (O&M) costs, and permitting uncertainty associated with utilization of reclaimed/recycle water.

Capacity factor assumptions for the repowered facilities may also commercially justify the potential use of sea water as makeup for a MDCT system. However, AES-SL expects the regulatory hurdles to employ this method will be considerable; thus, this option is not presently listed as an alternative. AES-SL will revise this OTC Plan to include the sea water MDCT alternative if the previously mentioned studies reveal a need to further explore this option.

The RBGS will also retain the existing connection to the City of Redondo Beach potable water system in the event reuse of reclaimed water is infeasible for providing high-purity process water.

2.2 PRIMARY ASSUMPTIONS

The key assumptions for AES-SL's phased retirement and repowering program as part of the OTC Implementation Plan include the following:

- Contracted capacity – Non-recourse project financing supported by long-term contracts through either the SCE Request for Offer (RFO) process or negotiated and transparent cost-plus PPAs as mandated under AB 1576. AES-SL's business model does not generally support merchant power market risk, so all potential repowering projects will have to be supported by long-term contracts or PPAs.
- Reliance on South Coast Air Quality Management District (SCAQMD) Rule 1304 (a) (2) to comply with all necessary requirements for emission reduction credits for the repowered units – AES-SL will not proceed with its repowering efforts at its facilities without the full utilization of this Rule. The potential cost of emission offsets for AES-SL's facilities would render the repowering program commercially infeasible.
- Lead agency and permitting timeline – The new units for AES-SL's repower program at its three generating stations will be permitted through the CEC. AES-SL anticipates that an Application for Certification (AFC) will require a minimum of 6 months to prepare. Based on the CEC's current processing time, we anticipate that a license could be secured within 18 to 24 months of being deemed data adequate, barring unforeseen controversy, which could extend the schedule.
- Procurement cycle – The AES-SL phasing schedule assumes the CPUC will direct SCE to procure replacement OTC resources as a result of the current LTPP process. It should be noted that this is inconsistent with Section 1.K of the OTC Policy, which assumes that new resources for the Los Angeles region will not be considered until the 2012 LTPP. Based on historical timelines, any new source procurement directives stemming from the 2010 LTPP would not result in CPUC-approved PPAs until the first quarter of 2014 and any new units would not achieve commercial operations until mid-2017. If new resources for the Los Angeles region are not considered until the 2012 LTPP, then replacement resources for the OTC units would not achieve commercial operations until mid-2019. Further, since the 2012 LTPP would be the last cycle that allowed for replacement resources to achieve commercial operations prior to the December 31, 2020 compliance date for the over 6,000 MW of gas-fired OTC units that are in SCE's territory, all OTC replacement resources would need to be procured through the same 2012 LTPP.
- Demolition and construction – AES-SL needs a minimum of 3.5 to 4 years for the demolition of existing units and construction of new units in the same footprint, depending in part on whether the new units are simple-cycle or combined-cycle gas turbines. AES-SL is planning on a nominal 2 years per phase for demolition of existing units to allow sufficient time for the maximum recovery of equipment and material for reuse and/or recycling, and for the abatement of materials such as asbestos and lead-based paint. Depending on the phase, demolition may occur prior to or after construction and commercial operation date (COD) of the new units based on factors such as existing PPA requirements and space limitations at the generating stations.
- Implementation Plans are a work-in-progress – The repowering of the AES-SL generating fleet must be supported by, and be consistent with, the CPUC's LTPP, the timing and

generation needs as specified in RFOs from the Investor-Owned Utilities (IOUs), and the ongoing and continuing electrical generation planning and management by the various state agencies. As the biennial LTPP and RFO cycles, and our continuing analysis, will have a direct affect on AES-SL's plans, we anticipate the results of these processes will cause significant changes to our current implementation plan in future years.

- **CONFIDENTIAL ASSUMPITION REMOVED**
- Reclaim water – While recycled/reclaimed water is, or can be, made available for AES-SL's Redondo Beach, Huntington Beach and Alamitos generating stations from various existing publicly-owned wastewater treatment plants, there are uncertainties regarding infrastructure improvements that may be required at the existing treatment plants and to the pipeline systems needed to convey the required volumes of recycled/reclaimed water to AES-SL's generating stations for use in a closed-cycle wet cooling system and for industrial make-up water for the generating units. In addition, there are the related permitting issues, capital cost, and O&M cost for this infrastructure that have yet to be fully evaluated. Based on these combined factors and issues, the option of using recycled/reclaimed water for power plant cooling appears less viable at this time; however, during the evaluation and selection of the final cooling technologies, AES-SL will consider reclaimed/recycled water as part of the Implementation Plans for the Redondo Beach, Huntington Beach and Alamitos generating stations pending further analysis and assessment.
- Potable Water – AES-SL will retain existing city potable water connections to the three generating stations and use this water for boiler and industrial make-up water as part of the repowering program in the event reuse of reclaimed water is infeasible for the remainder of in plant requirements.

3.0 COMPLIANCE PLAN AND PHASED IMPLEMENTATION SCHEDULE

As noted previously, the Implementation Plan for AES-SL and the RBGS must be phased and executed over multiple years. The primary drivers for the phasing include, but are not limited to the following:

- Electrical system stability – Due to our location in critical local reliability areas, AES-SL recognizes the need for its generating capacity to maintain certain minimum levels during this transition and in the future. AES-SL has studied the grid's needs and has prepared the plan accordingly in an attempt to ensure that our decisions do not negatively affect the grid stability or reliability. The grid stability and reliability includes energy and ancillary needs, resource adequacy, local voltage support, and inertia to facilitate higher levels of imported power. AES-SL provides this plan with these considerations in mind. The retirement of existing units and the commissioning of new generating technology must occur in stages at each site, otherwise too much or too little generating capacity would result at a site.
- SCAQMD Rule 1304 – Contemporaneous actions are needed to retire and replace MW in a consistent manner to comply with the applicable provisions of SCAQMD Rule 1304 (a)(2), which provides an exemption from providing emission offsets needed to permit and construct the replacement units. As the plan indicates, repowered MW are enabled by the retirement of MW either at the same AES-SL site or another AES-SL site. The plan attempts to most effectively use Rule 1304 by linking retirement commitments (in size and timing) to repowering plans.

- Available space – Preliminary studies indicate AES-SL may have the available space to construct approximately 2,300 MW across all three sites without the demolition of existing generating units. To construct any more than 2,300 MW across all three AES-SL sites requires the shutdown and demolition of existing generating units to make additional space available.

- Concerns about procurement process – SCE has understandably expressed concerns about concentrating counterparty and technology risks. Therefore, SCE must be directed to meet its future needs through multiple procurement cycles to enable both counterparty diversification and a sufficient period to resolve any new technology issues. If SCE is directed to procure in a single cycle, only those entities currently in the market with viable projects/permits employing those technologies that are proven and available will be part of the SCE choices. Additionally, credit support, available financing, equipment production capabilities, and people resources will not support a single solicitation.

- Auxiliary steam – The super critical boilers (Redondo Beach Units 7 and 8, Huntington Beach Units 3 and 4, and Alamitos Units 5 and 6) require auxiliary steam for startup, which is supplied by other units at the respective plants; therefore, these larger units will be retired first as part of the repowering program at their respective generating station. If other units were retired first, no source of auxiliary steam would available to start up the super critical boilers.

As shown in Table 1, AES-SL's current plan for RBGS would replace the four existing units at the facility in two separate phases with each phase involving the retirement of two units at the site. The first phase would initially place 300 MW in operation in the third quarter of 2018, another 300 MW in the fourth quarter of 2018 and 300 MW in the second quarter of 2019, for a total of 900 MW of new generation in the first phase. To facilitate the use of the SCAQMD's Rule 1304(a)(2) offset exemption, Units 7and 8 would be permanently retired and rendered inoperable approximately 90 days prior to the commercial operations of the first (2018) and last (2019) units in order to provide time for commissioning activities. There is available land at the RBGS to construct Phase 1 without demolishing any of the existing units, so the disruption in service between the new and retired units would be limited to only the time required for commissioning.

The second phase of the plan would entail the construction and commercial operations of 270 MW of new generation by the second quarter of 2024. The footprint for Phase 2 would be the property freed up due to the demolition of Units 7 and 8; therefore, consistent with the assumption outlined in Section 2.2, approximately 4 years are required between Phase 1 and 2.

All replacement technology will be gas turbine based. In total, RBGS is anticipated to be repowered to 1,170MW—all of which is contemplated to be combined cycle technology. As noted, the time between phases is to ensure a reasonable demolition, procurement and commissioning schedule.

The proposed phasing schedule is based on the following milestone assumptions:

AFC for RBGS Submitted to CEC	December 2011
2010 LTPP Decision Issued	December 2011
AFC Declared Data Adequate	April 2012

SCE RFO Launched (2010 LTPP)	July 2012
2012 LTPP Begins	Early 2012
SCE PPAs Awarded (2010 LTPP)	March 2013
CEC Permit Approved	October 2013
2012 LTPP Decision Issued	October 2013
CPUC Approves PPA (2010 LTPP)	January 2014
SCE RFO Launched (2012 LTPP)	July 2014
2014 LTPP Begins	Early 2014
Construction Begins on Phase 1	January 2015
SCE PPAs Awarded (2012 LTPP)	March 2015
2014 LTPP Decision Issued	October 2015
CPUC Approves PPA (2012 LTPP)	January 2016
SCE RFO Launched (2014 LTPP)	July 2016
SCE PPAs Awarded (2014 LTPP)	March 2017
CPUC Approves PPA (2014 LTPP)	January 2018
RBGS Units 7 and 8 Permanently Shut Down	December 2018/January 2019
First Units of Phase 1 Achieve COD	August 2018
Last Units of Phase 1 Achieve COD	March 2019
Demolition of RBGS Units 7 and 8 Begins	January 2019
Construction of Phase 2 Begins	January 2020
RBGS Units 5 and 6 Permanently Shut Down	March/April 2022
Demolition of RBGS Units 5 and 6 Begins	March 2022
Phase 2 Achieves COD	March/April 2024

The schedule above has approximately 1 year of float in it, but given the challenges of getting new generating units constructed in California, this contingency is reasonable. Additionally, as noted in Section 2.2, the milestones also assume that the current LTPP process will result in procurement directives for the Los Angeles region, which contradicts the assumption made in the OTC Policy. If the LTPP assumption in the OTC Policy is adhered to, and procurement for the Los Angeles Basin is not addressed until the 2012 LTPP, the schedule above will slip by approximately 2 years. Alternatively, if the 1-year contingency is eliminated, then the schedule slips by 1 year.

AES-SL also recognizes the schedule outlined above requires an extension of the compliance date for Units 5 and 6 at the RBGS beyond the current December 31, 2020 date specified in the OTC Policy. Given the timeline explained above, the magnitude of the project, and the constraints AES-SL is working within, it is not possible for all units to comply by 2020. However, as part of AES-SL's plan, the largest units will voluntarily demonstrate compliance prior to the 2020 target date. AES-SL is and will remain committed to achieving the earliest

feasible compliance date for all units. AES-SL believes such voluntary actions and commitment demonstrate best efforts and support the ultimate objectives of the OTC Policy.

Alternatively, if certain arrangements are finalized and AES-SL transacts the sale of Units 3 and 4 at the AES Huntington Beach Generating Station (HBGS) to Edison Mission Energy (EME), the previously mentioned plan for RBGS would be modified. If such arrangement is finalized, AES-SL will submit a modified plan to reflect this change. AES-SL contends that this potential asset sale does not change the ultimate objectives for the repowering at the HBGS but would potentially impact the repowered capacity at either the RBGS or the Alamitos Generating Station. Should the sale of Units 3 and 4 at the HBGS be completed, it is expected EME would retire these units by the fourth quarter of 2012 to enable the development of another generating facility within the SCAB of similar capacity to the HBGS's Units 3 and 4. The impacts of this potential sale and retirement on Units 3 and 4 at HBGS would include a reduction of 450 MW until such time that AES-SL could secure permits, long-term contracts and financing to replace the retired MW, but most probably no sooner than the second quarter of 2018. In this instance, AES-SL will prepare to participate in the 2012 RFO and explore the opportunities available through AB 1576.

4.0 INTERRUPTION IN SERVICE

Based on AES-SL's understanding of the electrical and transmission system in the Los Angeles Basin and our current phased repowering plan, other than the approximate ninety days between the shutdown of the existing units and the commercial operations of the new units to support commissioning activities, AES-SL is not aware of any time periods when electrical generation will be infeasible at the RBGS. This, of course, does assume the compliance date for Units 5 and 6 at RBGS is extended to December 31, 2022 so they can continue operating while the replacement resources are being constructed. Further, other than the commissioning periods, RBGS does not plan to have less than 900 MW of installed capacity at any time during this transition.

5.0 REPOWERED GENERATING UNITS INFORMATION

The phased retirement and repowering schedule for the RBGS provided in Table 1 provides the following information requested by the SWRCB:

- Size in maximum capacity MW of the repowered generation units
- Technology of the repowered generation units (i.e., combined-cycle and simple-cycle/single gas turbines
- Amount of electrical power that will still be generated during the phased retirement and repowering process, and the ultimate generation output at the completion of the phased retirement and repowering
- Timetable for the phased retirement and repowering

5.1 ELECTRICAL CHARACTERISTICS OF THE REPOWERED GENERATING UNITS

AES-SL has spent significant time and effort to understand how best to serve California in meeting its objective of 33 percent renewable generation by 2020, the reduction of ocean water for OTC retirement of aging electrical infrastructure and commissioning of highly flexible,

environmentally beneficial generation. These efforts parallel the reliability needs assessment mandated by Assembly Bill 1318.

As a result of AES-SL's work to date, AES-SL understands the critical value of operational flexibility as opposed to just reserve margins. Generation with flexible operating characteristics including quick and frequent start, responsive ramping, massive load shedding, and large load ranges are the right solution for California. As such, the RBGS plan includes technology that will supply all of these flexibilities in an environmentally responsible, cost-efficient manner.

5.2 AIR PERMITTING AND REQUIRED OFFSETS

AES-SL has the unique ability to execute on its plan in the highly regulated and air quality-constrained SCAB by relying on existing policy. Under the SCAQMD Rule 1304, the replacement of electric utility steam boiler(s) with qualifying generating technology is exempt from supplying emission offsets normally required by SCAQMD Rule 1303(b)(2) provided the maximum electrical power rating (in MW) of the new equipment does not increase basin-wide electricity generating capacity on a per-utility basis. Since AES-SL intends to retire its electric utility steam boiler(s) as new Rule 1304 qualifying generating technology is deployed, the execution of this Implementation Plan will not be constrained by a shortage of Emission Reduction Credits (ERCs).

Based on specific discussions with senior SCAQMD staff, under Rule 1304 and consistent with federal New Source Review (NSR) requirements, AES-SL will be able to retire and replace the Huntington Beach, Alamitos, and Redondo Beach Generating Stations on a MW-per-MW basis. The 1304 exemption in the SCAB can be transferred between AES-SL's generation stations as part of the consolidated repowering and retirement program at the three generating stations; that is, the retirement of generation at one AES-SL site can be replaced with qualifying generation technology at another AES-SL site provided the total MW of replacement generation does not exceed the total MW of retired generation at any point in time.

AES-SL understands there is adequate capacity in the SCAB's ERC market to enable the retirement and repowering of AES-SL's existing generating fleet in the basin by using the Rule 1304 exemption. The generating capacity within the Los Angeles Basin LCR is sufficient to meet forecasted demand. Further, it seems reasonable to rely on repowering at existing sites, as they are already industrial and have infrastructure in place, as opposed to creating new industrial sites in highly populated, urban areas.

There are potential constraints on the AES-SL repowering program posed by United States Environmental Protection Agency's (USEPA's) NSR requirements for particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) and the SCAQMD's proposed Rule 1325. These rules would restrict the maximum capacity of any repowered facility to less than the equivalent MW that would incrementally emit more than 99 tons of $PM_{2.5}$ without providing offsets. In the event a generation station is repowered to a capacity that had projected incremental emissions in excess of 99 tons of $PM_{2.5}$, all $PM_{2.5}$ emissions would have to be offset. The potential cost of such $PM_{2.5}$ offsets would render the repowering program commercially infeasible for any facility that exceeded this threshold. As $PM_{2.5}$ emission estimates and vendor guarantees for new generating units is currently not available, it is not possible to fully evaluate the potential impact of USEPA's NSR rules for $PM_{2.5}$. Further updates to this Implementation

Plan will be necessary when all emission constraints for each potential generation technology can be accurately assessed.

5.3 TRANSMISSION CONSTRAINTS

AES-SL has conducted third party engineering analyses of the interconnect limitations at the RBGS. Based upon the present physical constraints of the interconnections, the maximum generation capacity that can be installed at the RBGS is estimated to be 1,809 MW. The phased repowering program for the RBGS presented in Table 1 demonstrates that the maximum rated capacity will not exceed 1,656 MW at any point during the repowering program and no transmission constraints are anticipated.

6.0 PRIOR IMPINGEMENT MORTALITY AND ENTRAINMENT STUDY

The December 2007 Impingement and Mortality and Entrainment Study for the RBGS is provided electronically on a CD as Appendix A to this Implementation Plan. This study accurately reflects the current impingement and entrainment impacts at the RBGS. This impingement study accurately characterizes the species currently impinged and their seasonal abundance. This study also accounts for entrainment for seasonal variation in oceanographic conditions and larvae abundance and behavior such that abundance estimates are reasonably accurate. The entrainment study used a mesh size of 333 or 335 microns for entraining larvae samples. A copy of the December 2007 Impingement and Mortality and Entrainment Study for the RBGS was previously submitted in accordance with the regulatory requirements to the California Regional Water Quality Control Board – Los Angeles Region.

7.0 COMPLIANCE WITH IMMEDIATE AND INTERIM REQUIREMENTS

The immediate and interim measures proposed for compliance with the Section 2.C of the SWRCB OTC Policy and Resolution No. 2010-0020 are described in the following sections.

7.1 INSTALLATION OF LARGE ORGANISM EXCLUSION DEVICES

The RBGS has three ocean water intake structures which are fitted with velocity caps**,** Units 7 and 8 are supported by one intake structure, and Units 5 and 6 are supported by two intake structures. In accordance with Section 2C of the OTC Policy, no later than October 1, 2011, AES-SL will install large organism exclusion devices on the RBGS intake structures.

The Redondo Beach intake structures currently have large organism exclusion devices constructed of fiberglass C-Channels, on the top and bottom of the assemblies with vertical fiberglass rods between the top and bottom assemblies. The existing large organism exclusion devices were installed in the early 1980s and the present spacing of each vertical rod is at 15 inches on centers. No later than October 1, 2011, additional holes will be drilled in the existing fiberglass C-Channels to place new additional fiberglass rods at 7 inches on centers. This installation of additional fiberglass rods will meet the requirements of Section 2 (C) 1 of the OTC Policy of having a distance between exclusion bars of no greater than 9 inches.

7.2 CESSATION OF INTAKE FLOW TO UNITS NOT DIRECTLY ENGAGED IN POWER GENERATION OR CRITICAL SYSTEM MAINTENANCE

During Power Generation

While RBGS Units 5, 6, 7, and 8 are online, circulating water pumps are required for operation to provide cooling water to the RBGS main and auxiliary turbine steam condensers, and to the bearing cooling water heat exchangers There are two constant speed circulating water pumps per generating unit (eight pumps total). When a generating unit is in operation, both pumps are required to maintain unit efficiency as well as plant reliability.

During Unit Startup

Circulating water pumps are among the first equipment started and are therefore in service well before the units are online, generating power and released for dispatch. Early in the startup process, only one circulating water pump may be in service, followed by the second pump before the unit is online and generating power. The primary reason for circulating water flow during the early startup period is to provide cooling to the bearing cooling water heat exchangers and to allow for vacuum on the steam condensers. Both of these activities are mandatory. The following lists the startup procedures for the circulating water pumps at the RBGS:

- Unit 5 will have circulating water flow approximately 16.5 hours before the unit is online. The first circulating water pump, with a capacity of 36,000 gallons per minute (GPM) will be followed by a second pump with the same capacity 2 hours later.
- Unit 6 will have circulating water flow approximately 10 hours before the unit is online. The first circulating water pump, with a capacity of 36,000 GPM will be followed by a second pump with the same capacity 2 hours later.
- Units 7 and 8, super-critical, once-through steam generators, will have circulating water flow approximately 36 hours before the unit is online. The first circulating water pump, with a capacity of 117,000 GPM, will be followed by a second pump with the same capacity 3 hours later.

The operating schedules presented here describing the startup sequence of the generating units at the HBGS are approximate and based on a normal unit start up sequence. These times can vary depending on plant or system conditions, problems, or delays.

During Unit Shut Down

During a generation unit shutdown sequence, circulating water pumps are among the last equipment shut down after the unit has been removed from service and are therefore typically in service well after the unit is offline. Primary reason for circulating water flow during this period is to provide cooling water to bearing cooling water heat exchangers and steam condensers to allow for safe shut down of operating equipment. All four generating units at the RBGS follow a similar shutdown procedure. The generating units will use both circulating water pumps for 3 hours after the unit is offline. After 3 hours, one pump is shut off and a single circulating water pump operates for approximately 48 hours.

These times are approximate and based on a normal unit shutdown sequence. These times can vary significantly depending on plant or system conditions, problems, or delays.

During Non-Power Generation

When the generating units are offline and no longer generating power, circulating water pumps at the RBGS are periodically required for safe operation of critical plant systems. These critical plant systems include service air system, generator hydrogen sealing system, and instrument air system. These critical plant systems all require cooling water from the bearing cooling water system, which, over time, will rise in temperature requiring the circulation of cooling water to reduce the temperature of the bearing cooling water. When RBGS is not generating power, circulating water flow for critical plant systems is typically required from 1 to 3 hours per day to reduce bearing cooling water temperature. The amount of time it typically takes for the temperature in the bearing cooling water system to rise, and to be reduced, depends on many factors, including plant configuration, ongoing work or outages, cooling water tank levels, ambient air conditions, and circulating water temperatures. Normally one circulating pump with a capacity of 36,000 GPM is required for up to 3 hours per day for bearing cooling water, however, depending on cooling requirements once of the larger 117,000 GPM pumps may be cycled on to meet the water demands for these critical plant systems.

Current and past operating data demonstrate that there are no months when intake flows at the RBGS are likely to cease completely. Minimum month flows are typically January through March when power generation is expected to be at a minimum; however, as explained previously, one 36,000 GPM circulating ocean water at the RBGS is required for up to 3 hours per day at all times of the year.

7.3 INTERIM MEASURES TO MITIGATE IMPINGEMENT AND ENTRAINMENT IMPACTS FROM COOLING WATER INTAKE IF FINAL COMPLIANCE NOT ACHIEVED BY OCTOBER 1, 2015.

Section 2C(3) of the OTC Policy requires existing power plants to implement measures to mitigate the interim impingement and entrainment impacts resulting from the cooling water intake structure(s), commencing October 1, 2015, and continuing up to and until the owner or operator achieves final compliance. The owner or operator must include in the Implementation Plan the specific measures that will be undertaken to comply with this requirement.

The SWRCB has identified the preferred mitigation method as providing funding to the California Coastal Conservancy that will ultimately be used "for mitigation projects directed towards increases in marine life associated with the State's Marine Protected Areas in the geographic region of the facility." In addition, existing mitigation projects can be considered as part of the interim measures for cooling water intake impacts. These mitigation measures would be applicable to any OTC generation still in operation after October 1, 2015. The California Coastal Conservancy has identified several restoration projects in the South Coast region that, when implemented, would provide increases in habitat and production of marine life.

AES-SL proposes to provide funding to the California Coastal Conservancy as interim mitigation from October 1, 2015, and continuing up to and until the RBGS is in final compliance with the Policy. The amount provided will be based on the actual cooling water intake flow of each unit during each calendar year (January 1 through December 31). Discharge data

submitted to the California Regional Water Quality Control Board – Los Angeles Region will be used for the volume calculations. AES-SL will provide three dollars ($3.00) for each 1 million gallons (10^6 gallons) withdrawn by each unit at the RBGS. The calculations will be performed by AES-SL for the prior year, and the funds will be submitted to the Coastal Conservancy by AES-SL.

This approach will allow for consistent implementation of the Policy among the power generation plants required to conduct interim mitigation. By providing funding on an annual basis it also addresses uncertainties on the volume of cooling water necessary to support operations at the RBGS. This approach also avoids the uncertainties that are associated with the implementation of any restoration project and the difficulties in determining the appropriate level of funding for projects that might continue to require funding, and provides benefits well beyond the date when final compliance is achieved.

Tables

TABLE 1

PROPOSED PHASED SCHEDULE
IMPLEMENTATION PLAN: ONCE-THROUGH-COOLING WATER POLICY REQUIREMENTS
RETIREMENT AND REPOWERING
AES SOUTHLAND, LLC
(SEE NOTE 1 BELOW)

		Summary			Unit Retirement Date						Total	Unit COD Date						Total		Existing CAISO Maximum Capacity (Pmax)	Station Generating Capacity					
					2018		2019	2022		2024		2018		2019	2022		2024				2018		2019	2022		2024
Unit	Repowered w/	New MWs	CAISO Maximum Capacity (Pmax)	MW Delta	3rd QTR	4th QTR	2nd QTR	1st QTR	2nd QTR	2nd QTR		3rd QTR	4th QTR	2nd QTR	1st QTR	2nd QTR	2nd QTR			3rd QTR	4th QTR	2nd QTR	1st QTR	2nd QTR	2nd QTR
AL1	Simple Cycle Gas Turbines	100	174.56	-74.56	0	0		174.56	0	0		0	0	0	100	0	0								
AL2	-	0	175.00	-175.00	0	0		0	175	0		0	0	0	0	0	0								
AL3	Simple Cycle Gas Turbines	100	332.18	-232.18	0	0		0	0	332.18		0	0	0	0	0	100								
AL4	Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration, no duct firing)*	270	335.67	-65.67	0	0		0	0	335.67		0	0	0	0	0	270								
AL5	Simple Cycle Gas Turbines	400	497.97	-97.97	497.97	0		0	0	0		400	0	0	0	0	0								
AL6	2 x Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)*	600	495.00	105.00	495	0		0	0	0		0	300	300	0	0	0								
AL Add-on	Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)*	300	-	300.00	0	0		0	0	0		0	0	0	300	0	0								
AL Add-on	Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)*	300	-	300.00	0	0		0	0	0		0	0	0	0	300	0								
HB1	-	0	225.75	-225.75	0	0		225.75	0	0		0	0	0	0	0	0								
HB2	Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)*	300	225.75	74.25	0	0		0	225.75	0		0	0	0	0	300	0								
HB3	Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration, no duct firing)*	270	225.00	45.00	0	225		0	0	0		0	0	270	0	0	0								
HB4	Simple Cycle Gas Turbines	300	227.00	73.00	0	0	227	0	0	0		0	200	0	100	0	0								
RB5	**-**	**0**	**178.87**	**-178.87**	**0**	**0**		**178.87**	**0**	**0**		**0**	**0**	**0**	**0**	**0**	**0**								
RB6	**-**	**0**	**175.00**	**-175.00**	**0**	**0**		**0**	**175**	**0**		**0**	**0**	**0**	**0**	**0**	**0**								
RB7	**2 x Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)***	**600**	**505.96**	**94.04**	**0**	**505.96**		**0**	**0**	**0**		**300**	**300**	**0**	**0**	**0**	**0**								
RB8	**Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration)***	**300**	**495.90**	**-195.90**	**0**	**0**	**495.9**	**0**	**0**	**0**		**0**	**0**	**300**	**0**	**0**	**0**								
RB Add-on	**Combined Cycle Gas Turbine - (1 on 1, or 2 on 1 configuration, no duct firing)***	**270**	**-**	**270.00**	**0**	**0**		**0**	**0**	**0**		**0**	**0**	**0**	**0**	**0**	**270**								
	Totals	**4,110**	**4,269.61**	**-159.61**	**992.97**	**730.96**	**722.9**	**579.18**	**575.75**	**667.85**	**4,270**	**700**	**800**	**870**	**500**	**600**	**640**	**4,110**		**4,269.61**	**3,976.64**	**4,045.68**	**4,165.37**	**4,086.19**	**4,110.44**	**4,082.59**
																			ALGS	2,010.38	1,417.41	1,717.41	1,990.00	2,215.44	2,340.44	2,042.59
																			HBGS	903.50	903.50	878.50	921.50	795.75	870.00	870.00
																			RBGS	**1,355.73**	**1,655.73**	**1,449.77**	**1,253.87**	**1,075.00**	**900.00**	**1,170.00**

Note 1: The proposed phased schedule for the retirement and repowering of AES Southland, LLC's three Generating Stations (Alamitos, Huntington Beach and Redondo Beach) and the proposed electrical generation technology and resulting generation capacity for AES Southland LLC's Generation Stations are subject to change and are contingent upon various factors, including but not limited to: the release and award of Request for Offers (RFOs) and award of Power Purchase Agreements (PPA from the Inventor-Owned Utilities (IOUs), and the Los Angeles Basin Long-Term Procurement Plan (LTPP).

* 1 on 1 or 2 on 1 combined cyclet gas turbine configuration refers to one natural gas fired turbine and electric generator combined with a heat recovery steam generator and one steam turbine and electric generator OR two natural gas fired turbine and electric generator combined with a heat recovery steam generator and one steam turbine and electric generator

TABLE 2
DESIGN WATER INTAKE FLOW RATE
AND 93 PERCENT REDUCTION
IN WATER INTAKE FLOW RATE
REDONDO BEACH GENERATING STATION
AES-SOUTHLAND, LLC

Design Flow (GPM) of Circ Pump x Number of Pumps		Redondo Beach GS	93% Reduction Flow Rate
36,000	GPM x 2	**RB Unit 5**	5,040 GPM
36,000	GPM x 2	**RB Unit 6**	5,040 GPM
117,000	GPM x 2	**RB Unit 7**	16,380 GPM
117,000	GPM x 2	**RB Unit 8**	16,380 GPM
881,280,000	**GPD**	**RB GS Totals**	**61,689,600 GPD**

GPM - Gallons Per Minute
GPD - Gallons Per Day

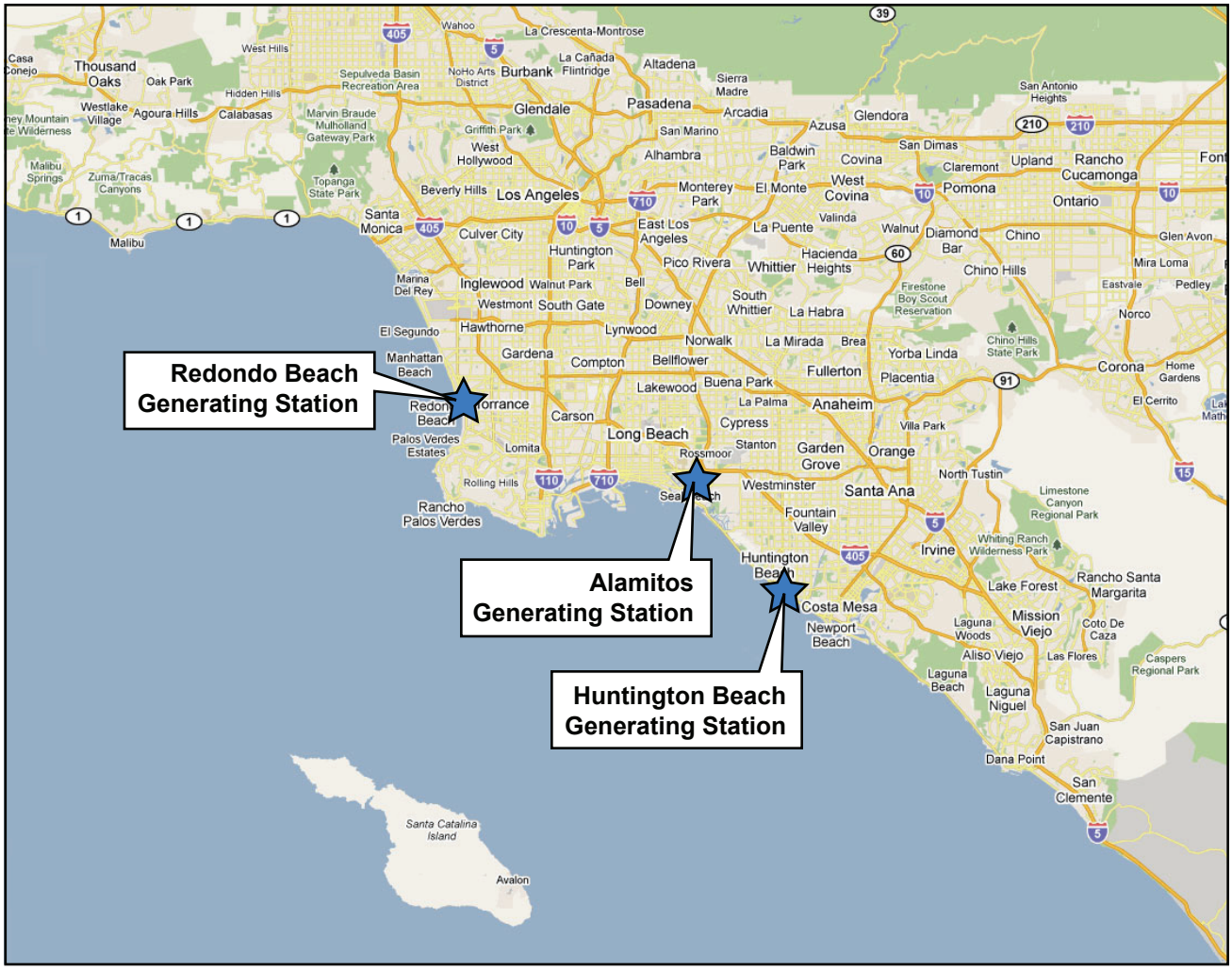
TABLE 3
Reclaimed/Recycled Water Availability
Redondo Beach Generating Station
Repowering Program
AES-Southland, LLC

Treatment Facility	Length of Proposed Pipeline Alignment (miles)	Effluent Level of Treatment			2010 Treatment Capacity (MGD)	2020 Planned Treatment Capacity (MGD)	2010 Average Daily Flows (MGD)	2010 Reclaimed Water Production (MGD)	2010 Committed Reuse (MGD)	2010 Available Reclaimed Water (MGD)	Potential Available Reclaimed Water after Treatment Upgrade (MGD)	Notes/Potential Limitations or Opportunities
		Secondary	Tertiary (Title 22)	Advanced (MF/RO/UV)								
AES Redondo Beach Generating Station – Repowering Program Closed-Loop Cooling System: 6.9-MGD Flow Rate												
Hyperion TP (HTP)	5.4	✓			450[1,5]	450[1,5]	342[1,5]	0	0	0	121[6]	Secondary effluent pumped to ELWRF for tertiary treatment[2]. West Basin's firm pumping capacity at Hyperion is 51 MGD[6].
Edward C. Little WRF (ELWRF)	5.1		✓		40.0[6]	46.5[6]	40.0[6]	28.5[2]	28.5[2]	0	6.5[6]	Goal is to increase HTP secondary effluent supply to 121 MDG by 2030, requiring flow equalization at ELWRF[6]. ELWRF treatment capacity limited to 40 MDG by Title 22 filters, with planned 6.5-MGD expansion by 2011[6].
Carson Regional WRF	9.6		✓		6.0[6]	23.0[6]	5.9[1]	5.9[1]	5.9[1]	0	17.0[6]	Expansion of nitrification treatment capacity by 2012[6]. Influent feed line capacity limited to 22 MGD.
Carson Regional AWTF	9.6			✓	5.0[1,6]	8.5[6]	5.0[1]	4.3	4.3[1]	0	3.5[6]	Expansion of MF and RO treatment capacity by 2012[6].
Joint WPCP (JWPCP)	8.4	✓			400[1]	400[1]	302[1,6]	0	0	0	200[7]	

Notes:
AWTF = advanced water recycling facility
MF/RO/UV = microfiltration/reverse osmosis/ultraviolent
MGD = million gallon(s) per day
WPCP = water pollution control plant
WRF = water recycling facility

Sources:
[1]U.S. Bureau of Reclamation Southern California Regional Brine-Concentrate Management Study – Phase 1 Lower Colorado Region, CH2M HILL 2009
[2]LASCD Twentieth Annual Status Report on Recycled Water Use Fiscal Year 2008-09
[3]OCSD Facilities Master Plan, OCSD 2009
[4]Long Beach Water Department and Water Replenishment District of Southern California Recycled Water Master Plan, MWH 2010
[5]City of Los Angeles Recycled Water Master Plan, CH:CDM 2006
[6]West Basin Municipal Water District Capital Implementation Master Plan for Recycled Water Systems, Carollo 2009
[7]Joint Groundwater Replenishment Feasibility Study RFP, Metropolitan Water District of Southern California 2010
[8]Michelson WRP flow data, Irvine Ranch Water District 2010 http://www.irwd.com/your-water/facilities-construction/michelson-water-recycling-plant1.html

Figures



North

0 5 10

Approximate scale in miles

FIGURE 1
Regional Map
AES-SL, Generating Stations
AES Southland, LLC

LEGEND

Site Boundary

Southern California Edison Property/Switchyard

North

0 500 1,000

Approximate scale in feet

FIGURE 2
Vicinity Map
Redondo Beach Generating Station
AES Southland, LLC

Aerial image © Google Earth, 2010. Annotation by CH2M HILL, 2011.

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Appendix A

Redondo Beach Generating Station Clean Water Act Section 316(b)
Impingement Mortality and Entrainment Characterization Study