



April 5, 2012

Ms. Joanna Jensen  
State Water Resources Control Board  
1001 I Street  
Sacramento, CA 95814

**RE: *Scoping Substitute Environmental Document (SED), proposed State Water Resources Control Board Seawater Desalination Policy***

Dear Ms. Jensen:

Thank you for the opportunity to comment on the scoping of the Substitute Environmental Document (“SED”) for the proposed amendments to the Water Quality Control Plans related to Desalination Facilities and Brine Disposal.

Poseidon Resources is the owner/developer of the Carlsbad Desalination Project (the “CDP”). The CDP is fully permitted and compliant with all State and federal laws and regulations. In addition to being fully permitted, the CDP has undergone complete environmental review under the California Environmental Quality Act (“CEQA”). Project construction was initiated in 2009, with initial site preparation underway, and full construction expected to begin in six months. The project represents 56,000 acre-feet per year of new, local water supply for the San Diego region, and would provide a comparable reduction in the region’s demand on the Sacramento-San Joaquin Bay Delta (“Delta”).

**I. THE SED MUST FULLY EVALUATE THE EFFECTS OF THE PROPOSED ACTION ON THE MARINE ENVIRONMENT**

The SED is required to be the “functional equivalent” of an environmental impact report under CEQA. *See Ebbetts Pass Forest Watch v. Cal. Dept. of Forestry & Fire Protection*, 142 Cal. App. 4th 656, 667 (2006). This means that the SED “must provide public and governmental decision makers with detailed information on the project’s likely effect on the environment, describe ways of minimizing any significant impacts, point out mitigation measures, and identify alternatives that are less environmentally destructive.” *See id.*; Pub. Res. Code § 21080.5(d)(3)(A); *San Joaquin River Exch. Contractors Water Auth. v. State Water Resources Control Bd.*, 183 Cal. App. 4th 1110, 1125 (2010). Therefore, the SED must evaluate, among other things, the likely impacts of the proposed amendments on the marine environment, including such impacts that could result if the proposed amendments render the CDP (or other proposed desalination facilities) infeasible and correspondingly require the construction of new seawater intake/discharge systems or place increased demands on the Delta.

The potential environmental impacts of the proposed amendments that require discussion in the SED include those discussed below.

## A. Discharge Effects

The San Diego Regional Water Quality Control Board (“San Diego Regional Board”) first adopted Waste Discharge Requirements (the “Permit”) for the CDP in August 2006. The Permit was amended in May 2009 to address the requirements of Water Code Section 13142.5(b). The original Permit expired in 2011. Poseidon Resources submitted an updated Report of Waste Discharge in March 2011. The 2006 Permit (as amended in 2009 (Order R9-2009-0038)) remains in effect until a new permit is adopted by the San Diego Regional Board. The Permit was the subject of multiple legal challenges that were successfully defeated by the Attorney General’s office. The Permit allows use of the existing seawater intake and discharge facilities of the adjacent Encina Power Station (“EPS”), and the use of seawater for the “in-plant” dilution of the concentrated seawater byproduct from the reverse osmosis seawater desalination process to ensure the salinity levels in the facility’s discharge are below that which would cause acute or chronic toxicity in the receiving water prior to discharge to the ocean environment. Attached is a diagram (i.e. “flow schematic”) of the connection between the desalination facility and EPS cooling water system (Attachment 1), findings from the San Diego Regional Board approval (Attachment 2), and a summary of the permit conditions (Attachment 3).

Despite the findings made in the Permit which specify in-plant dilution standards for the CDP, State Water Resources Control Board (“State Board”) staff overseeing the policy development has been advocating that the California Ocean Plan should be amended to prohibit the use of “in-plant” dilution of brine discharge from a desalination facility for establishing compliance with receiving water quality standards. Staff’s proposed alternative to in-plant dilution is a deep ocean outfall and high pressure diffuser system. For the CDP, such a system would require an additional capital expenditure of over \$200 million to construct a six foot diameter tunnel below the sea floor extending nearly one mile offshore where it would be connected to a high-pressure jet action diffuser (Attachments 4 and 5). Imposition of such a requirement on the CDP would render the currently approved project infeasible, and would directly result in abandonment of the existing surf zone discharge channel in favor of an offshore outfall and high pressure diffuser. Construction of such facilities would undoubtedly have significant environmental effects on the marine environment in the vicinity of the CDP, including the sensitive hard bottom kelp forest habitat located 2,000 - 3,500 feet offshore.

Because the proposed new policies and amendments advocated by staff could have a regulatory effect of disallowing in-plant dilution, and could require construction of new CDP facilities that would have direct and significant effects on the environment, the State Board’s action to approve the amendments must consider those effects in the SED.

Poseidon has a vested right to construct the CDP, as it has received final approval from the San Diego Regional Board (as well as the City of Carlsbad, the California Coastal Commission and the California State Lands Commission), invested substantial money and resources in reliance on those final approvals, and initiated construction of the facility in 2009. *See Avco Community Developers, Inc. v. S. Coast Regional Comm. Mission*, 17 Cal. 3d 785, 791 (1976) (“It has long been the rule in this state and in other jurisdictions that if a property owner has performed substantial work and incurred substantial liabilities in good faith reliance upon a permit issued by the government, he acquires a vested right to complete construction in accordance with the terms of the permit.”).

Poseidon also has a vested right to operate the CDP, subject to reasonable environmental regulations designed to address actual environmental impacts caused by the CDP's operation. *See Goat Hill Tavern v. City of Costa Mesa* 6 Cal. App. 4th 1519, 1530-31 (1992) (fundamental vested right to continued operation of business cannot be rescinded where operation is consistent with the reasonable terms and conditions of a properly-obtained permit, absent "compelling public necessity.").<sup>1</sup>

All of the CDP's potential impacts on the marine environment have been fully mitigated under the Water Code, and all statutory requirements under the Water Code have also been satisfied.<sup>2</sup> There has been no demonstration that there is a reasonable or rational basis for further environmental regulation of the CDP beyond the many conditions already imposed by the Regional Board under the Water Code.

The current environmental "baseline"<sup>3</sup> for the analysis of effects of the proposed amendments, with respect to the CDP, should include facilities that accommodate the permitted operation of the CDP, which Poseidon has a vested right to develop. Any environmental effects relative to this baseline that are directly or indirectly related to the proposed amendments must be fully evaluated in the SED. Regardless, construction and operation of the CDP, as permitted, is reasonably foreseeable, as are any impacts that will result from future regulation prohibiting permitted operation of the CDP.<sup>4</sup> All such impacts must therefore be assessed in the SED.

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<sup>1</sup> *See also id.* at 1526 ("When an administrative decision affects a right which has been legitimately acquired or is otherwise vested, and when that right is of a fundamental nature from the standpoint of its economic aspect or its effect...then a full and independent *judicial* review of that decision is indicated because the abrogation of the right is too important to the individual to relegate it to exclusive administrative extinction.") (original emphasis).

<sup>2</sup> Likewise, the CDP's impacts have been fully mitigated under the Coastal Act and Public Trust Doctrine, as determined in Project approvals issued by the Coastal Commission and State Lands Commission, respectively.

<sup>3</sup> Under CEQA, significant environmental effects or impacts are defined as substantial or potentially substantial adverse changes in the environment. Pub. Res. Code §§ 21068, 21100(d); CEQA Guidelines § 15382. The "environment" for the purposes of CEQA analysis refers to "the physical environmental conditions in the vicinity of the project"—and is referred to as the "baseline" against which the potential impacts of a proposed project are measured. CEQA Guidelines § 15125(a). Potentially significant impacts are assessed by measuring the potential effect of a proposed activity against this "baseline." CEQA Guidelines § 15126.2(a).

<sup>4</sup> Current physical conditions include the EPS operating at full capacity, with a much higher level of seawater intake than is required for stand-alone operation of the CDP. Thus, operation of the Project in a stand-alone mode would reduce seawater intake, and any associated marine life effects, relative to existing baseline conditions. *See Citizens of E. Shore Parks v Cal. State Lands Comm.*, 202 Cal. App. 4th 549, 557-62 (2011). In any event, the City of Carlsbad's EIR found that the CDP's operation will not cause any significant marine life impacts under CEQA, and that conclusion is final and no longer subject to review.

Therefore, the effects analysis should include an assessment of the impacts that construction of a new discharge facility would have on the on-shore and off-shore environment, including direct impacts on marine organisms exposed to a pressurized jet of concentrated seawater with a salinity that is nearly 50 percent greater than the acute toxicity threshold, recreational impacts due to construction on the Carlsbad State Beach, and air quality and climate change effects associated with emissions during construction. Long-term effects would also include increased energy needed for a pressurized discharge, and indirect air emissions associated with the increased amount of purchased electricity, including greenhouse gas emissions.

Furthermore, in assessing the potential marine life effects associated with high salinity discharges, the State Board staff's Informational Document for the SED's public scoping meeting cites a 1992 Southern California Coastal Water Research Project ("SCCWRP") study of the toxic effects of elevated salinity levels on giant kelp, an amphipod, and the purple sea urchin. The State Board staff has also commissioned a study by the Granite Canyon Marine Laboratory to determine the tolerance of Ocean Plan test species to various concentrations of high salinity discharge, based on a brine effluent sample from a single site. Additional site-specific toxicity studies are currently available and State Board staff should ensure the SED incorporates all currently available and relevant data on salinity-related toxicity effects from a seawater desalination facility's discharge. Using all the data publicly available will allow the State Board staff to appropriately account for the very site specific nature of marine life effects from the discharge of seawater with elevated salinity levels.

In this regard, the findings (i.e., 46 ppt of concentrate salinity level could be considered as an acceptable and conservative salinity-related toxicity threshold<sup>5</sup>) in the San Diego Regional Board's Permit related to the effects from the CDP's discharge were based on an extensive site-specific salinity-related toxicity study. The toxicity testing was completed in accordance with the Study Plan reviewed and approved by the San Diego Regional Board staff, and represents one of the most current studies of the potential toxicity effects from the discharge of concentrated seawater. This study was relied upon by the State Board in its dismissal of the petition requesting review of Regional Board Order R9-2009-0038 and was provided to staff on two prior occasions.<sup>6</sup> The study is being submitted again (Attachment 6) by Poseidon to ensure that the SED incorporates the most currently available and relevant data on salinity-related toxicity effects.

## **B. High Pressure Diffuser System Entrainment Effects**

The stated rationale for State Board staff's proposal for disallowing in-plant dilution is that the high pressure diffuser system is less destructive to marine organisms. This opinion held by staff is unsubstantiated, and is in direct conflict with well-documented facts and information

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<sup>5</sup> Carlsbad Seawater Desalination Project, San Diego Regional Water Quality Control Board, Region 9, Order No. R9-2006-0065, NPDES No. CA0109223, Salinity Related Toxicity Threshold for Short-Term Exposure, October 2, 2007

<sup>6</sup> Poseidon Resources letters to Dominic Gregorio dated May 25, 2011 and July 19, 2011.

that clearly demonstrate that such a change to the CDP would not result in any improvement to the marine environment.

Staff's argument in support of the high pressure diffuser is that by ejecting the undiluted brine discharge from the desalination facility directly into the offshore marine environment at a high velocity, the brine would rapidly mix with the surrounding seawater, thereby reducing the salinity concentration to sub-lethal levels within a few hundred feet. This simplified assumption of ignores three fundamental problems associated with staff's proposed method of discharge that individually and collectively would be highly destructive to the marine environment. The following effects must be evaluated in the SED:

### 1. Entrainment Impacts.

State Board staff has suggested that diffuser-based discharges are a superior discharge technology than the in-plant dilution strategy permitted for the CDP. Staff's preference for the high pressure diffuser is based on a misplaced assumption that this technology would avoid entrainment mortality associated with the pumping of water through the EPS cooling water system to provide in-plant dilution of the brine discharge from the desalination facility. However, there is peer-reviewed, published evidence that the same sort of entrainment mortality (due to turbulence and velocity shear pulling apart eggs and larva) also occurs in open, free-stream turbulent environments, similar to what would occur when these organisms are entrained into the turbulent mixing zone of the proposed high pressure diffuser system.<sup>7</sup>

The effect of turbulence on larval mortality was studied in the field by Jessopp (2007), who found that even turbulent tidal flows produce significantly increased mortality to larvae (specifically, thin-shelled veligers of gastropods and bivalves).<sup>8</sup> Discharge jet velocities from high pressure diffusers are on the order of 10 feet per second, which is generally higher than naturally occurring tidal flows. The turbulence from these high velocity jets effect large areas of receiving water on the order of hundreds of square meters (the turbulent mixing zone), resulting in the entrainment of significantly greater quantities of water than that contemplated for CDP in-plant dilution. In the highly turbulent mixing zone of a diffuser, entrained eggs and larvae suffer

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<sup>7</sup> See Jessopp, M.J., "The quick and the dead: larval mortality due to turbulent tidal transport", *J. Mar. Biol. Ass.*, UK, vol. 87., pp 675-680; Killgore, K.J., Miller, A.C., and Conley, K., 1987, "Effects of turbulence on yok-sac larvae of paddlefish", *Trans. Am. Fish. Soc.*, vol. 116, pp. 670-673; Horvath, T.G. and Lamberti, G.A., 1999, "Mortality of zebra mussel *Dreissena polymorpha*, veligers during downstream transport," *Freshwater Biology*, vol. 42, pp. 69-72; and Rehmann, C.R., Stoeckel, J. A., and Schneider, D.W., 2003, "Effect of turbulence on mortality of zebra mussel veligers", *Canadian*.

<sup>8</sup> Additionally, in fresh water, increased mortality of zebra mussel veligers (Rehmann et al, 2003) and yolk-sac larvae of paddlefish (Killgore et al, 1987) due turbulent shear has also been demonstrated under laboratory conditions. Horvath and Lamberti (1999) showed increased percentages of dead zebra mussel veligers with increasing downstream distance in a turbulent flume.

additional physical stress from contact with very high salinity, because the diffuser does not produce its full initial dilution until the outer edges of the mixing zone. This peer-reviewed published data suggests that the high pressure diffuser is more impactful than in-plant dilution because the turbulent shear forces associated with this technology effects considerably greater volumes than that required for in-plant dilution. The entrainment impacts associated with the high pressure diffuser to must be evaluated in the SED. Absent the State Board being able to provide the scientific studies necessary to demonstrate that the entrained organisms are able to survive exposure to the expected turbulence and velocity shear, the SED must assume 100 percent mortality of the entrained organisms. To properly evaluate the entrainment impacts associated with the high pressure diffuser, the State Board should conduct a site specific entrainment study over a twelve month period following protocols similar those required by the California Energy Commission for power plants and the California Coastal Commission for desalination facilities.

## **2. Toxicity Impacts.**

The average salinity of the Pacific Ocean off the coast of Carlsbad is 33.5 ppt with a natural variability of plus or minus 10 percent. Salinity levels above 46 ppt are considered to be toxic to certain marine organisms (see Attachment 6). In adopting Order No. R9-2006-0065, the San Diego Regional Board made a conscious decision to ensure the salinity levels in the CDP discharge are below that which would cause acute or chronic toxicity in the receiving water prior to discharge to the ocean environment. Under the Permit, the average daily salinity levels in the CDP discharge must be at or below 40 ppt prior to discharge to the Pacific Ocean.

Under the staff proposal, the average daily salinity levels in the CDP discharge would increase to 67 ppt, which is well above acute toxicity levels. Therefore, marine organisms entrained in the high-pressure jet discharge would be exposed highly toxic conditions. The effects associated with exposure of the entrained organisms to toxic levels of salinity must be evaluated in the SED following protocols similar to those required by the San Diego Regional Board for establishing the toxicity levels associated with the CDP discharge (see Appendix 6). Absent the State Board being able to provide the scientific studies necessary to demonstrate that the entrained organisms are able to survive exposure to salinity levels ranging from 46 to 67 ppt, the SED must assume 100 percent mortality of the entrained organisms.

## **3. Sensitive Species Impacts.**

The substitution of a high pressure diffuser for in-plant dilution effectively transfers the impacts from the confined channel of the EPS to an offshore location that will effect higher value and more sensitive offshore marine communities. Consequently, staff's proposal would have the potential to affect a greater diversity of marine organisms than would be impacted by the CDP under its permit. CDP entrainment studies provided to staff demonstrate that 96 percent of the marine organisms that would be entrained by the CDP under the Permit are three lagoon based fish species that are so plentiful that the entrainment losses do not represent a threat the species' ability to sustain existing populations.<sup>9</sup> Furthermore, the entrainment study found that no

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<sup>9</sup> See Carlsbad Desalination Facility Intake Effects Assessment, Tenera Environmental, March 3, 2005; Attachment IIa to the May 25, 2011 letter to Dominic Gregorio.

threatened or endangered species would be impacted by the CDP operations, and less than 0.5 percent of the entrained organisms were of commercial or recreational significance.<sup>10</sup> By shifting the discharge offshore, Staff's proposed high pressure diffuser system would have the effect of placing a highly toxic discharge in close proximity to sensitive hard bottom kelp forest habitat. Kelp forests are among the most productive and species-rich ecosystems in the world. The giant kelp forest off the Carlsbad coast is particularly rich, boasting a complex web of biodiversity and supporting many important fish and invertebrate species. The entrainment of marine organisms associated with staff's proposal may have an adverse impact on many of these species, including threatened rockfish populations. To properly evaluate the impacts on these species, the State Board should conduct a site specific entrainment study over a twelve month period following protocols similar those required by the California Energy Commission for power plants and the California Coastal Commission for desalination facilities.

### **C. Intake Effects**

State Board Staff has indicated that seawater desalination facilities will need to apply a "best available technology" standard to screening technology. The CDP was permitted based on the San Diego Regional Board's determination of best available technology under a co-located operational scenario with the adjacent EPS. If the selected technology were to be incompatible with EPS operations, and if Poseidon is required to install such screens prior to the EPC retiring or coming into compliance with the State Board's rule on Once Through Cooling, Poseidon would need to install a new intake. Staff should analyze impacts of new intake construction,<sup>11</sup> including those the applicable issues noted above for a new discharge construction, as well as additional operational impacts due to increased flow and related entrainment (based on the CDP withdrawing water directly from the ocean, rather than from the EPS discharge stream).<sup>12</sup>

It should also be noted, as a matter of policy, that it is not clear that such a change to the CDP would result in any improvement to the environment. As identified in the CEQA documentation for the CDP, and acknowledged in the findings of the Permit, the Project as analyzed, permitted, and conditioned, would not result in any significant environmental effects related to the marine environment, including ocean receiving waters, from the CDP's seawater intake or discharge.

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<sup>10</sup> Id.

<sup>11</sup> In approving the CDP, the Coastal Commission found, for example, that alternative intake systems "would result in greater environmental impacts than the proposed project due to destruction of coastal habitat from the construction of the intake systems, the loss of public use of coastal land due to numerous intake collector wells that would be located on the beach, and the adverse environmental impacts to coastal resources during construction, including but not limited to the creation of negative traffic, noise, and air pollution impacts." Coastal Commission's Final Adopted Findings in support of CDP approval, at page 51.

<sup>12</sup> The EPS circulating water daily demand would have met or exceeded the Carlsbad Desalination Plant (CDP) flow requirements of 304 MGD 89% of the time in 2008.

#### **D. Effects of the Proposed Action on State-Wide Water Supply**

A regulatory mandate of this magnitude was not contemplated when Poseidon established the budget for the Project, and cannot be recovered from the prospective purchaser of the water, the San Diego County Water Authority. Furthermore, the additional permits and associated mitigation required from the Coastal Commission, San Diego Regional Board and State Lands Commission to construct the new intake and outfall would delay project implementation untold years, which would have impacts on water supply planning and projections, including those quantities of local water supply accounted for in the San Diego County Water Authority Regional Water Facilities Master Plan, and the Urban Water Management Plans for the Authority and the City of Carlsbad. The delay would also affect water supply strategies identified in Metropolitan Water District's Integrated Resources Plan. All of these plans rely on seawater desalination to be online on or before 2016. Incorporation of seawater desalination into regional water supply planning is a key strategy in guarding against an indefinite delay in achieving a long-term Delta solution, and thereby avoiding substantial environmental effects related to the collapse of the Delta ecosystem.

The proposed changes in State regulatory policy would likely render the State's first large-scale seawater desalination project infeasible, and will have a chilling effect on other desalination projects that the State is counting on to fulfill the California Water Plan goal of 257,000 AF of seawater desalination by 2025, thereby placing additional demand on the Delta. Staff should analyze all direct and indirect impacts associated with such regulatory requirements, including any environmental impacts to the Delta that would occur should the CDP or other seawater desalination projects fail under the burden of the new regulations.

## **II. SEAWATER DESALINATION VS. ONCE-THROUGH COOLING**

The SWRCB needs to contrast and distinguish Once-Through Cooling ("OTC") from desalination open ocean intakes, as it did in the approved Water Quality Control Policy for the use of Coastal and Estuarine Waters for Power Plant Cooling ("OTC Policy").<sup>13</sup> Desalination of ocean water is not subject to the OTC Policy pursuant to the terms of section 316(b) of the Clean Water Act, which does not regulate desalination facilities. There are important reasons for distinguishing the OTC policy from the intake of ocean water for desalination, primarily because the use of ocean water is secondary to the primary function of power production, whereas it is essential for desalinated water production. Moreover, ocean water desalination facilities and power plants that use once-through cooling technologies have very different operational characteristics. Water intake volumes are substantially less for ocean water desalination than OTC water volumes used for cooling power plants. Ocean water desalination is included in the California Water Plan and is an important water supply option for local or regional water managers that must be preserved as an option in appropriate circumstances. If a desalination

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<sup>13</sup> *State Water Resources Control Board adopted Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling; Final Substitute Environmental Document*, page 57.



policy that limits desalination opportunities is adopted, a number of ocean desalination projects currently under development would be rendered infeasible. That would necessarily reduce the potential for an important public benefit of a clean, safe reliable water supply through desalination.

### **III. UNIVERSAL STANDARDS ARE NOT WARRANTED**

The Informational Document issued by the State Board states the purpose of the proposed amendments to be the following:

The planned amendment(s) would aim to control potential adverse impacts to aquatic life and other beneficial uses of California's bays, enclosed estuaries, and ocean waters associated with (1) the intakes for desalination facilities; (2) the brine discharges from desalination facilities; and (3) other brine discharges from sources such as groundwater desalting plants.

The Informational Document also acknowledges that the existing NPDES permitting structure already provides the regulatory framework to address discharges from seawater desalination facilities. Currently, NPDES permitting for desalination facilities considers all of the issues identified in the stated purpose for the policy. However, the Information Document states as the rationale for the proposed amendments that:

...the issues are complex and require significant staff resources and expertise to evaluate the most appropriate technology-based solution. Absent a statewide policy, permits for new desalination plants are likely to be delayed and challenged repeatedly by industrial and citizen petitioners. The planned amendment to the Ocean Plan would provide statewide consistency in controlling impacts from desalination plant intakes.

It is unclear what advantages are provided through "consistency" in approaching issues that are very unique and site specific, other than relieving burdens on Regional Boards' staff. In fact, application of common standards to issues that have a wide degree of variability may result in suboptimal solutions and exacerbate the conditions of delay and legal challenge that the State Board staff is trying to address. As demonstrated by the analysis of the Carlsbad project, the issues that are considered in the NPDES permitting process are very site specific in nature, and differ dramatically from sites in different locations along the California coast in terms of local substrate, species composition, ocean water temperature, salinity, waves, currents, etc.

### **IV. CONCLUSION**

The Ocean Plan desalination policy under development by the State Board acknowledges the importance of desalination as an important new municipal water supply for the State of California. Desalination reflects the spirit of the Porter-Cologne Act, specifically, Water Code Section 13000, which provides that: "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values

involved, beneficial and detrimental, economic and social, tangible and intangible.” The SED needs to analyze the balance between the competing need for water quality protection with the equally important need for the beneficial use of sources of brackish water and seawater to meet well documented municipal water demand.

Moreover, the CDP is in full compliance with California Water Code Section 13142.5(b), which requires new industrial facilities using seawater for processing to use the best available site, design, technology and mitigation measures feasible to minimize the intake and mortality of marine life. As such, the permitted design and operation of CDP establishes environmental baseline conditions. Because the proposed new policies and amendments advocated by staff could have a regulatory effect on the CDP and could require construction of new CDP facilities that would have direct and significant effects on the environment, the State Board’s action to approve the amendments must consider those effects in the SED.

Sincerely,



Peter MacLaggan  
Senior Vice President, Poseidon Resources

- cc: Thomas Howard, Executive Director  
Charles Hoppin, Chair  
Frances Spivy-Weber, Vice Chair  
Tam Doduc, Board member  
Ron Davis, CAL Desal  
Matt Hall, Mayor of Carlsbad  
Maureen Stapleton, SDCWA General Manager  
David Gibson, San Diego RWQCB Executive Officer  
Jerry Brown, Governor of California  
Kevin Jeffries, California State Assembly, District 66  
Diane Harkey, California State Assembly, District 73  
Martin Garrick, California State Assembly, District 74  
Nathan Fletcher, California State Assembly, District 75  
Toni Atkins, California State Assembly, District 76  
Brian Jones, California State Assembly, District 77  
Marty Block, California State Assembly, District 78  
Ben Hueso, California State Assembly, District 79  
Joel Anderson, California State Assembly, District 36  
Mark Wyland, California State Assembly, District 38  
Christine Kehoe, California State Assembly, District 39  
Juan Vargas, California State Assembly, District 40

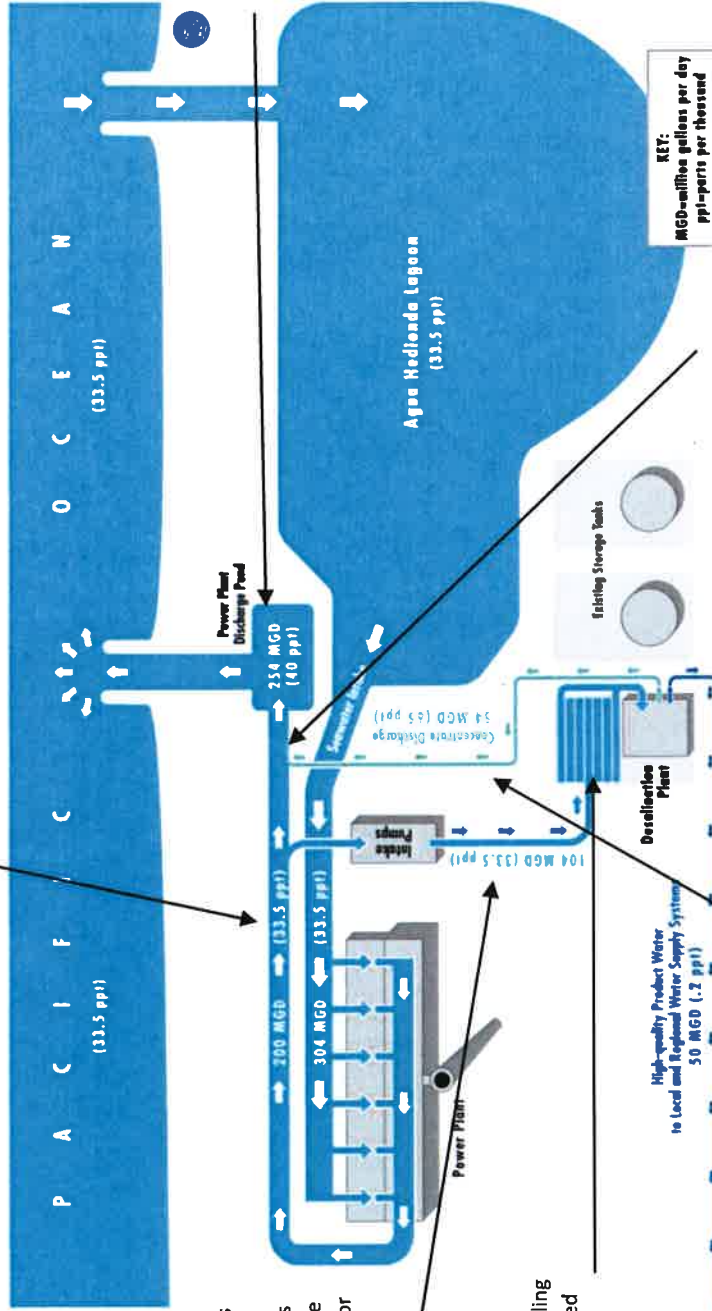
Enclosures

# Carlsbad Desalination Project

## Brine Discharge Flow Schematic

The Regional Water Quality Control Board found that the 40 ppt salinity concentration will not violate Ocean Plan acute or chronic toxicity standards. Receiving water salinity concentrations outside the zone of initial dilution (1,000' radius from the end of the discharge channel) will approach ambient conditions, and salinity concentrations within the zone of initial dilution will be 40 ppt or less.

Under the desalination Project's minimum flow requirement of 304 MGD of seawater enters the power plant intake facilities and after screening is pumped through the plant's condensers to the discharge channel and on to the ocean.



The Carlsbad desalination plant intake structure is connected to the end of this discharge canal and under minimum flow requirements would divert 104 MGD of the 304 MGD of cooling water for production of fresh water.

50 MGD of the diverted cooling seawater would be converted to fresh drinking water via reverse osmosis membrane separation.

This seawater concentrate would be returned to the power plant discharge canal downstream of the point of intake for blending with the remaining cooling water prior to conveyance to the Pacific Ocean.

The remaining 54 MGD would have salinity approximately two times higher than that of the ocean water (65 ppt vs. 33.5 ppt).

The Regional Water Quality Control Board found that the survival or reproduction of marine organisms would not be significantly affected at salinity concentrations of 40 ppt or less. To ensure that marine organisms are not harmed by the desalination plant discharge, the RWQCB issued a discharge permit for the project that limits average day effluent salinity concentrations in the discharge pond to 40 ppt.

## ATTACHMENT 2

### CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

#### SAN DIEGO REGION

9174 Sky Park Court, Suite 100  
(858) 467-2952 • Fax (858) 571-6972  
<http://www.waterboards.ca.gov/sandiego>

#### ORDER NO. R9-2009-0038

#### AMENDING

#### ORDER NO. R9-2006-0065 (NPDES NO. CA0109223) WASTE DISCHARGE REQUIREMENTS FOR THE POSEIDON RESOURCES CORPORATION CARLSBAD DESALINATION PROJECT DISCHARGE TO THE PACIFIC OCEAN VIA THE ENCINA POWER STATION DISCHARGE CHANNEL

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On August 16, 2006, the Regional Board adopted Order No. R9-2006-0065 (NPDES No. CA0109223) (Order No. R9-2006-0065) establishing waste discharge requirements for Poseidon Resources Corporation (Discharger or Poseidon) to discharge up to 57 million gallons per day (MGD) of a combined waste stream comprised of concentrated saline waste seawater and filter backwash wastewater from the Carlsbad Desalination Project (CDP) into the Pacific Ocean via the Encina Power Station (EPS) cooling water discharge channel. Intake source water from Agua Hedionda Lagoon (AHL) is to be drawn in through the existing EPS intake structure. The total flow rate of source water needed to operate the CDP at full production was determined to be 304 million gallons per day, in order to produce 50 MGD (MGD) of potable water. Of this source water, 107 MGD will be used for the production of 50 MGD of potable water (and 57 MGD of wastewater). The remaining 197 MGD of source water not used for production is needed as dilution water to comply with the salinity requirements of the NPDES Permit. This results in a total discharge flow rate of 254 MGD (57 MGD of wastewater and 197 MGD of dilution water).
2. Section 13142.5(b) of the California Water Code requires new or expanded coastal industrial facilities using seawater for cooling, heating, or industrial processing, to use the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of all forms of marine life.
3. Section VI.C.2.e. of Order No. R9-2006-0065 requires Poseidon to submit for Regional Board approval, within 180 days of adoption, a Flow, Entrainment and Impingement Minimization Plan (Minimization Plan) that "shall assess the feasibility of site-specific plans, procedures, and practices to be implemented and/or mitigation measures to minimize the impacts to marine organisms when the CDP intake requirements exceed the volume of water being discharged by the EPS." The Order requires an approved Minimization Plan to ensure that the CDP complies with section 13142.5(b) of the Water

## ATTACHMENT 2

Order No. R9-2009-0038

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May 13, 2009

Code when the CDP is co-located with EPS, but CDP's intake requirements exceed the volume of water being discharged by EPS under power generation operations ("co-location operation for CDP benefit"). Co-location operation for CDP benefit can occur under conditions (1) when EPS is temporarily shut down or (2) when EPS is operating but its discharge volume is not sufficient to meet CDP's intake requirements.

4. If EPS permanently ceases operations and the Discharger proposes to independently operate the existing EPS seawater intake and outfall for the benefit of the CDP ("stand-alone operation"), it will be necessary to evaluate whether, under those conditions, the CDP complies with the requirements of Water Code section 13142.5(b). Additional review will be necessary in part because under stand-alone operations, the Discharger will have more flexibility in how it operates the intake structure and outfall and additional and/or better design and technology features may be feasible. The Discharger will be required to submit a new Report of Waste Discharge to the Regional Board for authorization to operate in stand-alone mode, and shall seek review under CWC section 13142.5(b) for such stand-alone operation, with permanent shut down of the EPS facility, within 90 days after EPS provides written notice to the California Independent System Operator of its intent to shutdown permanently all of its generating units.
5. The Discharger anticipates that there may be times when one or more units at EPS are temporarily shutdown and not operating the seawater intakes for power generation operations. As discussed in Findings 29 and 38, the Discharger proposes to implement certain technology and design features during times of temporary shutdown. It is possible that under prolonged, but not permanent, EPS shutdown, additional technology or design features to further reduce intake and mortality of marine organisms could become available for implementation. The Discharger will be required to submit a technical report to the Executive Officer for review and approval evaluating the feasibility of any additional design or technology features within 45 days of being notified by EPS that all generating units will be non-operational for power production, without seawater intake for power production purposes, and unavailable to be called upon by the California Independent System Operator to produce power for a period of 180 consecutive days or more. If the Discharger identifies additional measures that could be implemented under such conditions, the Executive Officer may require the Discharger to implement them as soon as reasonably practicable for the duration of the prolonged period of temporary shutdown.
6. On February 13, 2007, the Discharger submitted a draft Minimization Plan dated February 12, 2007, intended to comply with Order R9-2006-0065. On June 29, 2007, in response to Regional Board and interested persons' comments, the Discharger submitted a revised Minimization Plan, dated June 1, 2007. The Regional Board reviewed the revised Minimization Plan, and in a letter dated February 19, 2008, informed the Discharger that the revised Minimization Plan was incomplete and included a detailed listing of items that needed to be addressed before the Regional Board could approve the revised Minimization Plan.

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7. On March 7, 2008, the Discharger submitted an updated version of the revised Minimization Plan, dated March 6, 2008.
8. On April 9, 2008, in a public meeting, the Regional Board adopted Resolution No. R9-2008-0039. The Regional Board determined that the revised Minimization Plan did not satisfy all of the requirements in Section VI.C.2.e. of Order No. R9-2006-0065, but conditionally approved the Plan subject to the conditions (1) that within six months, the Discharger submit an amended Minimization Plan that includes a specific proposal for mitigation of the impacts, by impingement and entrainment upon marine organisms resulting from the intake of seawater from Agua Hedionda Lagoon and (2) that the amended Plan address the items outlined in the February 19, 2008 letter to Poseidon and the following additional concerns:
  - a) Identification of impacts from impingement and entrainment;
  - b) Adequate monitoring data to determine the impacts from impingement and entrainment;
  - c) Coordination among participating agencies for the amendment of the Plan as required by Section 13225 of the California Water Code;
  - d) Adequacy of mitigation; and
  - e) Commitment to fully implement the amendment to the Plan.
9. Following the April 9, 2008 meeting, there was coordination among various state agency staff, including the Regional Board staff and the Discharger worked to develop the Marine Life Mitigation Plan (MLMP). The MLMP was heard by the Coastal Commission in August, 2008, and final language was agreed to between the Coastal Commission staff and the Discharger on or about November 7, 2008.
10. On November 18, 2008, the Regional Board received the MLMP, dated November 14, 2008, as an amendment to the March 6, 2008, Minimization Plan. The Discharger intended the MLMP to satisfy the conditions in Resolution No. R9-2008-0039.
11. On February 11, 2009, in a public meeting, the Regional Board was scheduled to consider whether the MLMP satisfied the conditions established in Resolution No. R9-2008-0039 or whether failure to satisfy the conditions rendered the Resolution inoperative by its own terms. At the commencement of the meeting, the Executive Officer identified a list of outstanding issues concerning the March 6, 2008 Minimization Plan, as supplemented by the MLMP. The outstanding issues were identified as follows: "(1) Placing Regional Water Board and its Executive Officer on equal footing, including funding, with Coastal Commission and its Executive Director, in the MLMP, while minimizing redundancies (e.g., only one Scientific Advisory Panel), with details of dispute resolution process to be worked out; (2) Reducing the number of sites to five, in consultation with the Coastal Commission, with the existing proviso that other sites within

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the Regional Board boundaries could be added.; (3) Poseidon to provide the flow-proportioned calculations for Poseidon's impacts due to impingement, to help support the Board's determination that these impacts are *de minimis*.; and (4) Poseidon to provide a consolidated set of all requirements imposed to date by the various agencies."

12. The Regional Board heard public comment at the February 11, 2009 hearing, but with the concurrence of the Discharger, continued the matter to its April 8, 2009 meeting. The Regional Board directed staff to work with the Discharger to expeditiously address the list of the outstanding issues identified by the Executive Officer and further directed staff to prepare for Regional Board consideration a resolution or order approving the Flow, Entrainment, and Impingement Minimization Plan required by Order No. R9-2006-0065.
13. Following the February 11, 2009 meeting, Regional Board staff and the Discharger met on numerous occasions to discuss the outstanding issues. On March 9, 2009, the Discharger submitted a further revised Minimization Plan, including the MLMP, for Regional Board consideration. On March 27, 2009, the Discharger submitted revisions to the March 9, 2009 Minimization Plan. The March 9, 2009 Minimization Plan, as revised on March 27, is hereinafter referred to as the March 27, 2009 Minimization Plan.
14. The Regional Board reviewed the March 27, 2009 Minimization Plan to determine whether its implementation will result in the "use [of] the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of all forms of marine life" under co-location operation for CDP benefit.

### SITE

15. Chapter 2 of the March 27, 2009 Minimization Plan addresses identification of the best available site feasible for the CDP to minimize the intake and mortality of marine life under conditions of co-location operation for CDP benefit.
16. The CDP will be co-located with EPS and use EPS's existing intake and discharge facilities, which draw cooling water from AHL and discharge into the Pacific Ocean.
17. The Discharger has defined four fundamental project objectives for the CDP: (1) to provide a local and reliable source of potable water not subject to variations of drought or political or legal constraints; (2) to reduce local dependence on imported water; (3) to provide water at or below the cost of imported water supplies; and (4) to meet the CDP's planned contribution of desalinated water as a component of satisfying regional water supply planning goals.
18. Co-locating the CDP with EPS allows the CDP to use the existing EPS intake and discharge facilities. Using EPS's existing intake and discharge facilities allows the CDP to minimize the intake and mortality of marine life by reducing the amount of source water

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required to be withdrawn directly from AHL for desalination purposes by the amount of water discharged by EPS.

19. By co-locating with the EPS, the CDP will use the wastewater stream discharged by the EPS as its first source of water. The discharge of the EPS wastewater to the Pacific Ocean is subject to R9-2006-0043, a NPDES permit issued to Cabrillo Power I LLC by the Regional Board. The Discharger's proposed beneficial reuse of EPS's discharge water is a form of conservation of water resources through water recycling expressly encouraged by the State of California.
20. The Discharger evaluated three sites in the City of Carlsbad that would accommodate a large desalination project. These sites include (1) other locations on the EPS property, (2) the Encina Water Pollution Control Facility, and (3) the Maerkle Reservoir.
21. The Discharger concluded that all three alternatives were found to be infeasible for the following reasons:
  - (1) Other locations within the Encina Power Station property: Alternative sites within the EPS property were infeasible because the power plant owner has reserved the remaining portion of the site to accommodate future power plant modifications, upgrades or construction of new power plant facilities
  - (2) Encina Water Pollution Control Facility: This site could only accommodate a desalination plant with a 10 MGD production capacity, due to the outfall constraints. Use of this site would also require the construction of an intake pipeline to convey source water from the power plant cooling canal; and
  - (3) Maerkle Reservoir: The public rights-of-way between the reservoir and the Pacific Ocean do not have sufficient space to accommodate an intake pipeline and concentrate line. Use of this site would also require the pumping of over 100 MGD of seawater to an elevation of 531 feet (compared to 70 feet at the proposed site) for processing. This area has also been zoned as "Open Space."
22. The Project EIR, certified by the City of Carlsbad on June 13, 2006, evaluated only alternative 2 above, and concluded the Encina Water Pollution Control Facility site would not be as effective as the proposed location in satisfying the objectives of the project. The EIR did not evaluate other locations within the EPS since other locations within the EPS were determined to be substantially the same as the proposed site.
23. The Discharger concludes that the proposed location for the CDP at the EPS (as previously approved by the Regional Board in NPDES Permit No. R9-2006-0065) is the best available site for the Project because there are no feasible and less environmentally damaging alternative locations.



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24. The EPS site is the only site in reasonable proximity to the existing seawater intake and outfall, and to key delivery points of the water distribution system of the City of Carlsbad, the largest user of proposed desalinated water anticipated by the Discharger. The use of existing intake and discharge facilities at the EPS site avoids construction of a major new intake system and discharge facilities.
25. Under the scenario proposed in the Discharger's Report of Waste Discharge for Order No. R9-2006-0065 as described in Section II.B. of that Order, there are no better alternative and feasible sites available for the CDP. The Regional Board finds that the proposed site for the CDP is the best available site feasible under co-location operation for the benefit of CDP.

### DESIGN

26. Chapter 3 of the March 27, 2009 Minimization Plan addresses identification of the best available design feasible to minimize the intake and mortality of marine life under co-location operation for CDP benefit.
27. A key feature of the proposed design is the direct connection of the desalination plant intake and discharge facilities to the discharge canal of the power generation plant. This approach allows the CDP to use the power plant cooling water as both source water for the seawater desalination plant and as a blending water to reduce the salinity of the desalination plant concentrate prior to the discharge to the ocean. Under the conditions of co-location with the EPS, however, Poseidon has little control over the intake structure.
28. When EPS is producing power and is discharging 304 MGD or more of seawater for once-through cooling, the March 27, 2009 Minimization Plan concludes that the proposed desalination plant operation would cause a *de minimis* increase in entrainment and impingement of marine organisms. Under conditions of co-location operation for CDP benefit, the Discharger must comply with Water Code section 13142.5(b) and use best available design feasible to minimize incremental increases in intake and mortality of marine life for operation under these conditions. Based on flow data submitted by the Discharger, the EPS would have provided approximately 89% of the CDP required flow in 2008 indicating that the CDP would have been responsible for minimizing intake and mortality of the additional approximately 11% increment in impacts from EPS operations conducted for the benefit of CDP. The March 27, 2009 Minimization Plan concludes that under this condition, direct use of the EPS discharge and variable frequency drives on the desalination plant intake pumps will result in a substantial reduction in intake and mortality of marine life.
29. The March 27, 2009 Minimization Plan also concludes that additional design features will be employed to minimize intake and mortality of marine life when EPS is temporarily shut down. The CDP must comply with the best available design requirement in Water Code section 13142.5(b) when EPS is operating for the benefit of CDP (whether EPS is

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temporarily shut down or not otherwise discharging sufficient volume of water to meet CDP's operational needs). Features that will be incorporated in the desalination plant design to reduce impingement, entrainment, and flow collection when EPS is temporarily shut down include operation of a modified (EPS) pump configuration to reduce both inlet (bar racks) and fine screen velocity, and ambient temperature processing. While the percentage of time EPS is temporarily shut down has not been predicted and the Discharger has not quantified the expected reduction in impingement and entrainment during operation under these conditions, it is reasonable to conclude that reductions in impingement and entrainment will occur when CDP implements these features.

30. Available information shows that under the conditions of co-location operation for CDP's benefit, the Discharger has little control over the intake structure and the corresponding intake pumps. Under the conditions of co-location operation, the existing intake meets the best available design criteria. The Regional Board finds that the proposed design for CDP operations is the best available design feasible under co-location operation for the benefit of CDP.
31. The Discharger indicates that the design features it will use under limited co-location operations would also serve as best available design under stand-alone conditions. As indicated above, the Regional Board is not considering the adequacy of design alternatives for stand-alone operating conditions at this time. Once EPS permanently shuts down and the CDP is operated as on stand-alone basis, the Discharger will have more flexibility in design implementation. It will be appropriate to undertake additional evaluation under CWC section 13142.5 at that time to determine whether any additional and/or superior design features are feasible for CDP stand-alone operations.

### **TECHNOLOGY**

32. Chapter 4 of the March 27, 2009 Minimization Plan addresses identification of the best available technology feasible to minimize the intake and mortality of marine life under co-location operation for the CDP's benefit.
33. Because CDP will be co-located with the EPS, technological modifications to the existing intake channel to minimize the intake and mortality of marine life must be compatible with both EPS's and CDP's operations. In addition, the Amendment of Lease PRC 8727.1 [State Lands Commission lease with Cabrillo Power LLC I (EPS operator)] to authorize CDP's use of the intake and outfall recognized that entrainment and impingement minimization measures cannot interfere with, or interrupt ongoing power plant operations.
34. The Discharger analyzed and investigated a number of alternative seawater intake, screening, and treatment technologies prior to selecting the desalination plant intake, screening, and seawater treatment technologies planned for the CDP. When economic, environmental and technological factors are taken into account, the power plant intake

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screening alternatives are not capable of being accomplished in a successful manner within a reasonable period of time.

35. The Discharger analyzed the following intake alternatives: (1) Subsurface intake (vertical and horizontal beach wells, slant wells, and infiltration galleries); (2) new open ocean intake; (3) Modifications to the existing power plant intake system; and (4) Installation of variable frequency drives (VFDs) on seawater intake pumps.
36. The Discharger compared screening technologies to identify the best available technology feasible including: (1) Fish net, acoustic and air bubble barriers upstream of the existing intake inlet mouth; (2) New screening technologies to replace the existing inlet screens (bar racks); and (3) fine vertical traveling screens.
37. Implementation of the alternatives associated with the modification of the existing power plant intake and screening facilities were infeasible because they would interfere with, or interrupt, power plant scheduled operations. Taking into account economic, environmental and technological factors, the power plant intake screening alternatives are not capable of being accomplished in a successful manner within a reasonable period of time.
38. The Discharger identified intake technologies it will employ to reduce intake and mortality of marine organisms during temporary or permanent shutdown of the EPS. The CDP intake pump station design will incorporate variable frequency drives to reduce the total intake flow for the desalination facility to no more than that needed at any given time, thereby minimizing the entrainment of marine organisms.
39. Under the conditions of co-location operations for CDP's benefit, the Discharger has little control over the intake structure and little flexibility in implementing different technologies. Under these circumstances, the Discharger has identified the best technologies feasible to minimize the intake and mortality of marine life at this time. The Regional Board finds that the proposed technology for the CDP is the best available technology feasible under co-location operation for the CDP benefit. Because different and/or better technologies may be feasible under stand-alone operations, the Regional Board will require evaluation of CDP's compliance with Water Code section 13142.5(b) under those conditions.

### **MITIGATION**

40. Chapter 6 of the March 27, 2009 Minimization Plan describes mitigation measures associated with the CDP, incorporates the November 14, 2008 Marine Life Mitigation Plan previously submitted by the Discharger, and addresses identification of best mitigation feasible to minimize intake and mortality of marine life under conditions of co-location operation for CDP benefit. By attachment, Poseidon includes baseline studies of the existing marine system in the area that could be affected by the facility.

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41. The MLMP sets forth a plan for mitigation and monitoring for impacts due to entrainment from the CDP as means of complying with Water Code section 13142.5(b). It was developed by the Discharger in consultation with multiple resource agencies including the Regional Board, and was approved by the California Coastal Commission (Commission) on August 6, 2008. Coastal Commission staff worked with the Discharger and the final language for the MLMP was approved by the Coastal Commission on December 10, 2008. The MLMP was written for stand-alone operation, and proposes phased implementation of up to 55.4 acres of wetland mitigation within the Southern California Bight. Phase I requires the creation of 37 acres, and Phase II requires an additional 18.4 acres which the Discharger may propose to eliminate or reduce if it proposes alternative mitigation, such as new entrainment reduction technology or mitigation credits for dredging.
42. The MLMP proposes mitigation to be selected from among 11 potential sites in southern California. These sites are Tijuana Estuary, San Dieguito River Valley, Agua Hedionda Lagoon, San Elijo Lagoon, Buena Vista Lagoon, Huntington Beach Wetland, Anaheim Bay, Santa Ana River, Los Cerritos Wetland, Ballona Wetland, and Ormond Beach. Additional sites may be incorporated if appropriate. The Minimization Plan clarifies that preference will be given to mitigation in the San Diego Region, to the extent feasible.
43. Within 10 months of receiving the Coastal Development Permit from the Commission, the Discharger must submit to the Commission, and the Regional Board, a list of the selected mitigation site or sites, and corresponding preliminary restoration plans, for review and agency approval. Within two years of issuance of the Coastal Development Permit for the CDP, the Discharger must submit a complete application to restore at least 37 acres of estuarine wetlands. Six months following the Regional Board's and Commission's approval of the selected sites and proposed restoration, pending necessary permits, the Discharger must begin wetland construction. The Discharger must submit similar plans for Phase II implementation, if Phase II implementation is required, within 5 years of receiving the Coastal Development Permit for Phase I implementation.
44. The MLMP also contains mitigation monitoring requirements, and criteria for performance standards similar to those required of Southern California Edison's mitigation for SONGS at San Dieguito lagoon. The MLMP also provides for the oversight of such monitoring by a scientific advisory panel, and commits to public availability of monitoring results.
45. The Regional Board considered multiple approaches to estimating impingement associated with the CDP's projected operations under co-located conditions as presented in the March 27, 2009 Minimization Plan. The estimates derived from the multiple approaches range from 1.56 kg/day to 7.16 kg/day of fish impinged. The Discharger contends that the appropriate estimate of impingement is 1.56 kg/day and contends that the estimate of 4.7 kg/day overstates the projected impingement associated with CDP's operations. The Discharger and Regional Board staff disagree as to whether, and to what extent, it is appropriate to exclude two days of very high impingement during the

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- 2004-2005 sample year when projecting impingement. The Discharger refers to the data from the two very high impingement days as "outliers." Staff disagrees that the Discharger has adequately justified its characterization of the data as "outliers" and disagrees with the Discharger's proposed exclusion of the data from the estimate of future impingement. The Regional Board finds that it is unnecessary to resolve these disputes. The Regional Board finds that 4.7 kg/day is a reasonable, conservative estimate of impingement associated with CDP's projected operations under co-located conditions and notes that the Discharger has agreed to meet a fish productivity standard of 1,715.5 kg/year, derived from the estimate of 4.7 kg/day, in the mitigation wetlands.
46. It is appropriate to establish a fish productivity requirement that must be achieved to compensate for projected impingement based on the estimate of 4.7 kg/day. Using this estimate, it is reasonable to establish 1,715.5 kg/year as the fish productivity requirement. This requirement will be considered a "Biological Performance Standard" under section 5.4.b. of the MLMP.
  47. To demonstrate that the mitigation wetlands required by the MLMP achieve the fish productivity requirement of 1,715.5 kg/year as described in Section 6.2.1 of the Minimization Plan, the Discharger will conduct fish productivity monitoring pursuant to a Productivity Monitoring Plan (PMP). The Discharger will be required to submit a proposed PMP concurrently with the proposed Restoration Plan in section 2.0 of the MLMP for review by the Scientific Advisory Panel (SAP) established in the MLMP and review and approval by the Executive Officer. The measurement of productivity shall be conducted in accordance with the methodology used in Allen, "Seasonal Abundance, Composition, and Productivity . . .," Fishery Bulletin, Vol. 80, No. 4 1982, pages 769-790, and shall follow, but need not be limited to, Allen's methodologies as set forth on pages 771-773 and 779-783. Productivity monitoring shall be conducted once per month for a 13 month measurement period (per Allen's methodology), beginning four years after completion of the construction of the wetlands, with a review of the results by the SAP. For the purposes of determining fish biomass available to contribute toward the fish productivity requirement of 1,715.5 kg/year, the Discharger will use the accounting method set forth in a modification to the March 27, 2009 Minimization Plan approved by this Order in ordering paragraph 1.b. The SAP will review the proposed PMP for adequacy in design for the purpose of allowing the Regional Board to evaluate the Discharger's compliance with the fish productivity requirement. The PMP is subject to the framework established in Conditions B and C of the MLMP and to the Regional Board's corresponding authorities under Condition B for purposes of administration.
  48. Once operations commence, it will be valuable to consider impingement over the course of a one year period per permit cycle to evaluate impingement impacts associated with CDP's operations. The Regional Board will require the Discharger to sample and report on impingement according to an impingement monitoring program (IMP) using the methods set forth in sections 9.3 and 10.2 of Attachment 4 (and Attachment C, referenced therein) to the March 27, 2009 Minimization Plan, excluding heat treatment

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events.

49. Based upon the results of the IMP, the Executive Officer may determine that it is appropriate to adjust the fish productivity requirement of 1,715.5 kg/year upward or downward for the next permit cycle.
50. Although the CDP will rely on EPS discharge water for its source water to the extent it is available, the mitigation provided for in the Minimization Plan, incorporating the MLMP, as conditioned below is expected to fully offset projected entrainment and impingement losses for up to 304 MGD of source water withdrawn directly from the Agua Hedionda Lagoon under conditions of co-located operation. With these required modifications to the March 27, 2009 Minimization Plan, the Regional Board finds that the proposed mitigation for the CDP is the best available mitigation feasible for the CDP.

### **GENERAL**

51. This Order amends Order No. R9-2006-0065 to require the Discharger to implement and comply with the March 27, 2009 Minimization Plan under co-location operations to benefit the CDP.
52. Implementation of the March 27, 2009 Minimization Plan will ensure that the CDP is in compliance with Water Code section 13142.5(b) under co-location operations to benefit the CDP.
53. Implementation of the March 27, 2009 Minimization Plan is not required by the federal Clean Water Act and does not represent an effluent standard or limitation within the meaning of section 1365 of the federal Clean Water Act [Title 33, Federal Water Pollution Control Act, section 505]. Failure to implement and comply with the Minimization Plan is not a violation subject to mandatory minimum penalties under section 13385, subdivision (h) or subdivision (i) of the Water Code, because it is not an "effluent limitation" as defined by Water Code section 13385.1, subdivision (c).
54. EPS's operations are regulated in part by Regional Board Order No. R9-2006-0043 (NDPES No. CA0001350) issued to Cabrillo Power I, LLC, on August 16, 2006. The Discharger's and EPS' use of the intake structure in accordance with Order No. R9-2006-0065, and the March 27, 2009 Minimization Plan during co-location operations to benefit the CDP, does not constitute "cooling water flow" as that term is used in Section V.B. of Order No. R9-2006-0043. Therefore, EPS need not comply with Section V.B, but shall continue to comply with Sections V.A and V.C. of Order No. R9-2006-0043, when operating the intake structure during co-location operations to benefit the CDP.
55. According to Section 13263(e) of the California Water Code, the Regional Board may, upon application by any affected person, or on its own motion, review and revise waste discharge requirements. Section 122.62(a) of title 40 of the Code of Federal Regulations

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authorizes the reopening and modification of an NPDES permit based upon new information.

56. Order No. 2006-0065 is not being reopened for any other purpose than the revisions contained herein. Except as contradicted or superseded by the findings and directives set forth in this Order, all of the previous findings and directives of Order No. R9-2006-0065 remain in full force and effect.
57. This action supersedes Resolution No. R9-2008-0039, which considered an earlier version of the March 9, 2009 Minimization Plan, in its entirety. Resolution No. R9-2008-0039 has no ongoing force or effect.
58. This action is exempt from the requirement of preparation of environmental documents under the California Environmental Quality Act [Public Resources Code, Division 13, Chapter 3, Section 21000 et seq.] in accordance with Section 13389 of the California Water Code.
59. The Regional Board has notified all known interested parties of its intent to adopt Order No. R9-2009-0038.
60. At its public meeting on April 8, 2009, the Regional Board reviewed the March 27, 2009 Minimization Plan to determine whether its implementation will result in the "use [of] the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of all forms of marine life" pursuant to CWC section 13142.5(b) when CDP is operated under co-located conditions for CDP benefit. After receiving and considering evidence and testimony concerning the March 27, 2009 Minimization Plan and adoption of Order No. R9-2008-0038, the Regional Board closed the public hearing on April 8, 2009. The Board continued the matter to May 13, 2009 for final decision to allow staff time to revise the Tentative Order consistent with individual board member comments and to prepare written responses to comments received throughout the proceeding for Regional Board consideration.
61. On May 1, 2009, a revised Tentative Order was circulated and mailed to interested persons. On May 8, 2009, interested persons were notified that a responsiveness summary prepared by Regional Board staff was posted on the Regional Board's website. The Regional Board has reviewed the responsiveness summary and concurs with the responses therein. The responsiveness summary is hereby incorporated as findings of the Regional Board.
62. The Regional Board in a public hearing on May 13, 2009 heard and considered all comments pertaining to the adoption of Order No. R9-2009-0038.
63. If during preparation of the final adopted documents the Executive Officer determines that minor, non-substantive corrections to the language of the adopted Order, including

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the response to comments, are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Board of any such changes.

THEREFORE, IT IS HEREBY ORDERED:

1. The March 27, 2009 Minimization Plan submitted pursuant to Provision VI.C.2.e. of Order No. R9-2006-0065 is hereby approved subject to the following conditions:

a. Biological Performance Standard:

The March 27, 2009 Minimization Plan is amended at p. 6-10 to establish a biological performance standard (requirement) of fish productivity (i.e., the production of new fish biomass) of 1,715.5 kilograms (kg)/year to be achieved in the wetlands mitigation site(s) created or restored through the MLMP. A new row is added at the end of section 5.4 ("Post-restoration Monitoring and Remediation") with the following language inserted in column 3 as follows:

"5.4.b. ('Biological Performance Standards') 7. *Impinged Fish Productivity*. Commencing four years after construction of the wetlands has been completed, the Discharger shall demonstrate that the wetland site(s) achieve no less than 1,715.5 kg of fish productivity per year (as determined through the monitoring and accounting method set forth in section 6.5.1 of the Minimization Plan). The Executive Officer shall consider any adjustment to the biological performance standard/fish productivity standard proposed by the Discharger pursuant to section 6.5.2, and any other relevant information, in determining whether to adjust the standard of 1,715.5 kg/year for the next permit cycle. The Discharger may seek review of the Executive Officer's determination by an appeal to the Regional Board."

b. Productivity Monitoring Plan. The March 27, 2009 Minimization Plan is amended at page 6-8 to add new section 6.5.1 that requires the Discharger to submit a proposed Productivity Monitoring Plan consistent with the Minimization Plan at section 6.2.1. as follows:

"The Discharger shall submit a Productivity Monitoring Plan (PMP) concurrently with the Wetland Restoration Plan required by Section 2.0 of the MLMP to the Scientific Advisory Panel (SAP) for review and to the Executive Officer for review and approval. The measurement of productivity shall be conducted in accordance with the methodologies used in Allen, "Seasonal Abundance, Composition, and Productivity . . .," Fishery Bulletin, Vol. 80, No. 4 1982, pages 769-790 (set forth in Attachment 7 of the March 27, 2009 Minimization Plan). Implementation of productivity monitoring in accordance with Allen's methodology shall be for the purpose of determining productivity, defined by Allen as rate of production of biomass per unit of time (measured in grams per



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unit area per unit time) and shall follow, but need not be limited to, Allen's methodologies as set forth in pages 771-773 and 779-783. Monitoring shall be conducted once per month for a 13-month period beginning four years after completion of construction of the mitigation wetland site(s), and every fifth year thereafter. The Executive Officer, upon consultation with the SAP, may designate a different representative 13-month period. To the extent feasible, the 13-month period shall be coordinated to match the 12-month period set forth in 1.c.(1) below for impingement monitoring. The Discharger may propose modifications to or variations from Allen's productivity methodologies when it submits the PMP or through a subsequent proposed revision to the PMP. Any proposed revisions following initial approval of the PMP are also subject to review by the SAP and review and approval by the Executive Officer. If the Executive Officer, after consulting with the SAP, determines that the project is successful in meeting the biological productivity standard, the monitoring program may be waived.

The PMP shall describe the design and proposed implementation of the PMP, including a description of the proposed sampling timing, frequency, locations and methodology and shall describe the fish biomass available to contribute to the fish productivity requirement based on the following accounting:

- a. Most Commonly Entrained Lagoon Species: Gobies, Blennies, and Garibaldi;
- b. Most Commonly Entrained Ocean Species: White croaker, Spotfin croaker, Queenfish, Northern anchovy, California halibut;
- c. All Other Species: All other entrained and non-entrained fish.

The biomass from Lagoon, Ocean, and Other Species shall be deemed available to contribute to the annual fish productivity requirement in the following proportions: 0% (Most Commonly Entrained Lagoon Species); 88% (Most Commonly Entrained Ocean), and 100% (All Other Species).

Available Fish Biomass (i.e., biomass available to contribute to the annual fish productivity requirement) shall be calculated as follows:

Available Fish Biomass = (88% x Biomass of Most Commonly Entrained Ocean Species) + (100% x Biomass of All Other Species)

The PMP shall explain when and how baseline productivity will be assessed and the methods and frequency for evaluating productivity. The SAP will review the proposed PMP and make recommendations on design and implementation to the Executive Officer prior to approval.

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The PMP is subject to the framework established in Conditions B and C of the MLMP and to the Regional Board's corresponding authorities under Condition B for purposes of administration. The Discharger agrees to fund the SAP's work in reviewing the proposed PMP (and any later proposed revisions thereto) and subsequent review of monitoring results when consulted by the Executive Officer, up to \$25,000 beyond the annual cap of \$100,000 established in the MLMP."

- c. Impingement Monitoring Program. The March 27, 2009 Minimization Plan is amended at page 6-8 to add new section 6.5.2 to require the Discharger to conduct impingement sampling at the EPS seawater intake and report results pursuant to an Impingement Monitoring Program (IMP) and pursuant to the additional reporting requirements established below.

(1) Compliance Schedule. Monitoring shall be conducted one day per week for 52 continuous weeks during the first 12 months after the CDP commences full operations that also occurs entirely within the next permit cycle. Thereafter, monitoring shall be conducted in the first year of each permit cycle. The Executive Officer may designate a different representative 12-month period prior to the commencement of CDP operations.

(2) Impingement Sampling. The Discharger shall sample impingement in accordance with the methodology described in Attachment 4 of the March 27, 2009 Minimization Plan (Sections 9.3 and 10.2, and Section 4.2 of Attachment C, referenced in both Sections 9.3 and 10.2) such that impingement monitoring shall be of fish and macroinvertebrates following the 2004-2005 sampling protocol, excluding the requirement for impingement sampling during heat treatment.

(3) Reporting. A report containing a detailed analysis of the fish impingement sampling data shall be submitted in hard copy and in an electronic copy in workable format (e.g. Word or Excel) to the Regional Board within 6 months after the sampling program is complete. The Discharger shall report all impingement data as follows:

(a) Impingement shall be adjusted to reflect the flow proportional approach, as described in and consistent with Proportional Approach 3-B of the March 27, 2009 Minimization Plan, unless the Regional Board determines that a different approach is appropriate and shall be used.

(b) Impingement shall not be proportionally adjusted in accordance with section c.3.(a) of this section when impingement results from a non-flow related event. Whether an event is non-flow related shall be determined by the Discharger in consultation with the Executive Officer and shall be based upon information provided by the Discharger about survey rainfall data, tide data, turbidity data,

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salinity data, dredge operation status and unusual conditions within the lagoon or related to the EPS/CDP plant operations.

(c) The Discharger shall report all recorded data and provide a report that presents (i) a clear presentation of fish and invertebrate impingement at the shared intake for normal (non-heat treatment) operations during the sampled year; (ii) an analysis of impingement and flow volume; (iii) an analysis of the impingement and velocity; (iv) dates on which a modified pump configuration was in operation during the year sampled, if any; and (v) any other information deemed reasonable and necessary by the Executive Officer, and reasonably available to the Discharger, upon review of the report. The Discharger shall include in the report any proposed adjustment to the biological performance standard/fish productivity standard of 1,715.5 kg/yr for the next permit cycle.

2. **Section VI.C.2.e in Order No. R9-2006-0065 is amended as follows:**

On March 27, 2009, the Discharger shall submit submitted a Flow, Entrainment and Impingement Minimization Plan (March 27, 2009 Minimization Plan) within 180 days of adoption of the Order which was approved by the Regional Board on May 13, 2009. The approved Plan shall assess identifies the best available site, design, technology, and mitigation feasible to be used by the Discharger to minimize the intake and mortality of all forms of marine life during CDP operations the feasibility of site specific plans, procedures, and practices to be implemented and/or mitigation measures to minimize the impacts to marine organisms when the CDP is co-located with EPS, but the CDP intake requirements exceed the volume of water being discharged by the EPS and EPS operates its seawater intake and outfall for the benefit of the CDP. The Discharger shall implement and comply with the terms of the Minimization Plan as approved by the Regional Board. The plan shall be subject to the approval of the Regional Water Board and shall be modified as directed by the Regional Water Board. In the event that the EPS permanently ceases operations, and the Discharger proposes to operate the seawater intake and outfall independently for the benefit of the CDP as a stand-alone facility, additional review to determine whether the CDP complies with Section 13142.5 (b) of the Water Code will be required.

3. The following will be added as Section VI.C.2.f. in Order No. R9-2006-0065 as follows:

Within ninety days after the EPS provides written notice to the California Independent System Operator of its intent to shutdown permanently all of its generating units, the Discharger shall submit a Report of Waste Discharge to the Regional Board for authorization to operate in stand-alone mode with permanent shutdown of the EPS facility and shall seek review under California Water Code section 13142.5(b) for such stand-alone operation.

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a. The conditions of Order No. R9-2006-0065, as amended by this Order, or as amended or replaced by subsequent orders, shall remain in force until the Regional Board takes final action on the Discharger's Report of Waste Discharge to operate in stand-alone mode.

4. The following will be added as Section VI.C.2.g. in Order No. R9-2006-0065 as follows:

After commencement of discharge from the CDP, the Discharger shall submit a technical report to the Regional Board Executive Officer within 45 days after the Discharger is notified by the EPS that all units at the EPS will be non-operational for power generation, without seawater intake, and unavailable to the California Independent System Operator to be called upon to produce power for a consecutive period of 180 days or more. The technical report shall include a detailed description of any feasible design or technology measures, in addition to those identified in the March 27, 2009 Minimization Plan for temporary shut down, that Poseidon will use to minimize the intake and mortality of all forms of marine life while EPS is in a period of prolonged temporary shutdown. Upon approval by the Executive Officer, Poseidon shall implement the additional minimization measures in accordance with the technical report as soon as practicable and for the duration of the prolonged temporary shutdown.

5. Table 12 in the Fact Sheet will be modified as follows:

Potential Issue	EIR Finding	EIR-Required Mitigation	Regional Board Analysis
Entrainment & Impingement	No Significant Impact. When operating in conjunction with EPS, the operation of CDP will not change EPS flows and flow velocities, nor cause additional impingement losses. Additional entrainment loss is ~ 0.01% to 0.28%. When operating independent of EPS, flow volume and velocity would be substantially reduced, meeting federal performance standards for impingement. Entrainment loss would range from 2% to 34% of that of EPS.	In the event the EPS were to permanently cease operations, and the Developer were to independently operate the existing EPS seawater intake and outfall for the benefit of the project, such independent operation will require CEQA compliance and permits to operate as required by then-applicable rules and regulations for the City and other relevant agencies.	The CDP is not subject to 316(b) regulations. To ensure compliance with California Water Code Section 13142.5(b) requirements <u>when the CDP is co-located with the EPS but the CDP intake requirements exceed the volume of water being discharged by the EPS and EPS operates for the benefit of the CDP</u> , Provision VI.C.2.g of Order No. R9-2006-0065 requires the discharger to develop a plan to minimize entrainment and impingement, obtain

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		<p>Regional Board approval for the plan, and implement the plan. <u>the discharger must implement and comply with the March 27, 2009 Flow, Entrainment and Impingement Minimization Plan approved by the Regional Board on May 13, 2009. If EPS ceases operations and the Discharger proposes to operate the seawater intake structure and outfall independently for the benefit of the CDP as a stand-alone facility, the Regional Board will require reevaluation of the requirements of Water Code section 13142.5(b).</u></p>
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6. Section VII.B.2.e in the Fact Sheet will be modified as follows:

e. Flow, Entrainment and Impingement Minimization Plan

The Discharger's Report of Waste Discharge assessed EPS cooling water flows over a 20.5-year period and concluded that historical EPS flows were sufficient to supply CDP intake flows and provide sufficient dilution water to insure that receiving water salinity is not adversely impacted. The Discharger also concluded that during temporary periods when power generation is suspended for maintenance, unheated EPS thru-flows would be adequate to supply CDP and provide sufficient dilution water to protect receiving water salinity. The Regional Water Board recognizes that future EPS flows may not follow historical trends. For this reason, **the Regional Board requires the Discharger to implement and comply with the approved** it is warranted to require the Discharger to ~~prepare a~~ Flow, Entrainment and Impingement Minimization Plan to ensure that the requirements of section 13142.5(b) of the Water Code are complied with when CDP's intake requirements exceed the volume of water being discharged by the EPS and EPS operates for the benefit of the CDP. ~~The Flow Minimization, Entrainment and Impingement Minimization Plan shall be submitted within 180 days of adoption of the Order.~~

~~The plan shall assess the feasibility of site-specific plans, procedures, and practices to be implemented and/or mitigation measures to minimize the impacts to marine organisms~~

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~~when the CDP intake requirements exceed the volume of water being discharge by the EPS. The plan shall be subject to the approval of the Regional Water Board and shall be modified as directed by the Regional Water Board.~~

**7. Section VII.B.4.b in the Fact Sheet will be modified as follows:**

b. California Water Code Section 13142.5(b) Applicability. Water Code Section 13142.5(b) requires industrial facilities using seawater for processing to use the best available site, design, technology, and mitigation feasible to minimize the intake and mortality of all forms of impacts to marine life. The CDP is planned to operate in conjunction with the EPS by using the EPS cooling water discharge as its source water. When operating in conjunction with the power plant, the desalination plant feedwater intake would not increase the volume or the velocity of the power station cooling water intake nor would it increase the number of organisms impinged and entrained by the Encina Power Station cooling water intake structure. Recent studies have shown that nearly 98 percent of the larvae entrained by the EPS are dead at the point of the desalination plant intake. As a result, a *de minimis* of organisms remain viable which potentially would be lost due to the incremental entrainment effect of the CDP operation. Due to the fact that the most frequently entrained species are very abundant in the area of the EPS intake, Agua Hedionda Lagoon and the Southern California Bight, species of direct recreational and commercial value would constitute less than 1 percent of all the organisms entrained by the EPS. As a result, the incremental entrainment effects of the CDP operation in conjunction with the EPS would not trigger the need for additional technology or mitigation to minimize impacts to marine life.

In instances when the CDP's intake requirements exceed the volume of water being discharged by EPS, the CDP will implement the approved Flow, Entrainment and Impingement Minimization Plan to comply with the requirements of Water Code section 13142.5(b) to use the best available site, design, technology and mitigation feasible to minimize the intake and mortality of marine life.

~~However, in In the event that the EPS were to cease operations, and the discharger were to independently operate the seawater intake and outfall for the benefit of the CDP, such independent or stand-alone operation will require additional Regional Board review to ensure that CDP operations comply with the requirements of pursuant to Water Code Section 13142.5(b) by employing any additional and/or better design or technology features that were not feasible when EPS was in operation. The Regional Water Board review and approval of the Flow Minimization, Entrainment and Impingement Minimization Plan will address any additional review required pursuant to Water Code Section~~

**8. The following will be added as Section VII.B.2.f in the Fact Sheet:**

f. Productivity Monitoring Plan

## ATTACHMENT 2

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May 13, 2009

This Order modifies the March 27, 2009 Minimization Plan to add a Productivity Monitoring Plan component that will be used to evaluate whether the Discharger has achieved the annual fish productivity requirement of 1,715.5 kg/year established in the Minimization Plan.

Of the up to 55.4 acres of mitigation wetlands that the Discharger has agreed to create or restore to offset potential stand-alone entrainment, the Discharger explained that 49 acres (88%) are designated to mitigate for the entrainment of the most commonly entrained lagoon species (i.e., gobies, blennies and garibaldi), and 6.4 acres (12%) are designated to mitigate for the entrainment of the most commonly entrained ocean species (i.e., white croaker, northern anchovy, California halibut, queenfish, spotfin croaker) such that, therefore, all other species (i.e., other entrained and non-entrained species) present in the wetland are "available" to offset losses due to impingement. In order to be consistent with Section 6.2.1 of the March 27, 2009 Minimization Plan, the biomass of gobies, blennies and garibaldi shall be excluded from productivity calculations, and available fish biomass for productivity calculations shall be calculated as follows:

$$\text{Available Fish Biomass} = (88\% \times \text{Biomass of Most Commonly Entrained Ocean Species}) + (100\% \times \text{Biomass of All Other Species})$$

9. The following will be added as Section VII.B.2.g in the Fact Sheet:

g. Impingement Monitoring Program

As issued on August 16, 2006, this Order did not require the Discharger to monitor for fish impingement. In conjunction with the approval of the March 27, 2009 Minimization Plan on May 13, 2009, the Regional Board determined that monitoring for impingement is necessary. The Order modifies the March 27, 2009 Minimization Plan to add a requirement to perform and report impingement pursuant to an Impingement Monitoring Program (IMP) over a one year period per permit cycle. The IMP provisions in the Minimization Plan establish the impingement monitoring requirements.

The objective of the impingement monitoring is to obtain periodic estimates of impingement levels at the shared intake when the CDP is in co-located operation with EPS. The results of the impingement monitoring will be used to evaluate whether the 1,715.5 kg/year fish productivity requirement should be adjusted in the next permit cycle.

The current CDP impingement projection of 1,715.5 kg/year is based on sampling conducted at EPS during 2004-05, prior to the operation of the CDP. Although the current projection was adjusted to account for a CDP flow of 304 MGD (in accordance with Proportional Approach 3-B of Attachment 5 to the March 27, 2009 Minimization Plan), a projection based on sampling conducted once the CDP is in operation may be more representative than the current projection.

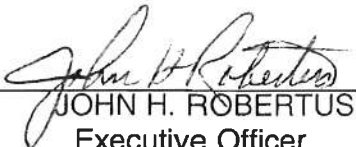
ATTACHMENT 2

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May 13, 2009

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Order adopted by the California Regional Water Quality Control Board, on May 13, 2009.

  
\_\_\_\_\_  
JOHN H. ROBERTUS  
Executive Officer



## ATTACHMENT 3

### Carlsbad Desalination Project Permit Information:

**Procedural History.** The San Diego Regional Water Quality Control Board (“San Diego Regional Board”) first adopted Waste Discharge Requirements (the “Permit”) for the Carlsbad Desalination Project (the “CDP”) in August 2006. The Permit was amended in May 2009 to incorporate a Flow, Entrainment, and Impingement Minimization Plan to address the requirements of Water Code Section 13142.5(b) when the CDP is co-located with the Encina Power Station (the “EPS”) but the CDP intake requirements exceed the volume of water being discharged by the EPS. The original Permit expired in 2011. Poseidon Resources (the “Discharger”) submitted a updated Report of Waste Discharge in March 2011. The 2006 Permit (as amended in 2009 (Order R9-2009-0038)) remains in effect until a new permit is adopted by the SDWQCB.

**Process Description.** CDP requires an average daily flow of approximately 100 million gallons per day (“MGD”) to produce 50 MGD of fresh potable water. Under normal operating conditions, the source water for the CDP would be diverted from the EPS. When the EPS discharge is insufficient to meet the needs of the CDP, the Discharger is authorized to divert additional water from the EPS intake to meet the source water requirements of the CDP. Treatment processes at CDP will consist of pretreatment, reverse osmosis desalination, and disinfection and product water stabilization. The 50 MGD of fresh potable water produced by CDP would be distributed to San Diego County water agencies. The production of 50 MGD of fresh potable water would result in the generation of approximately 55 MGD of combined filter backwash water and concentrated saline wastewater that would be discharged back into the EPS cooling water discharge channel for discharge to the surf zone immediately west of the EPS. The discharge would contain virtually all dissolved solids and some of the suspended solids contained in the CDP intake water. The wastewater flow volumes within the EPS discharge channel would be reduced by 50 MGD, however contain a greater concentration of dissolved solids (mostly natural sea salts). The high-energy mixing associated with surf zone discharge provides for rapid mixing and dispersion of the concentrated sea salts in the CDP discharge.

**Summary of Waste Discharge Permit Requirements (Order R9-2006-0065).** Specific to the protection of receiving water quality requirements, key findings and requirements include:

- The project complies with all existing federal and state water quality policies, laws and regulations.

### ATTACHMENT 3

- The current EPS NPDES permit assigns an initial dilution of 15.5:1 for the existing EPS discharge.
- The Regional Water Quality Control Board found that the survival or reproduction of marine organisms would not be significantly affected at salinity concentrations of 40 ppt or less. The modeling results further indicate that initial dilutions under the conditions of the worst case month, for any single month of the year at the edge of the zone of initial dilution (ZID) will exceed 20:1. Modeling results indicate that actual dilutions under the conditions of the worst case month, for any single month of the year at the edge of the zone of initial dilution (ZID) will exceed 20:1.
- Salinity concentrations within the receiving waters in the area of EPS varied by approximately 10 percent over the 20.5 years of data.
- The Discharger commissioned several studies to assess whether the projected increases in the receiving water salinity will adversely affect marine species that exist in the vicinity of the EPS/CDP discharge point. These studies indicate that no salinity-related acute toxicity effects would occur at a salinity level below 40 ppt.
- To prevent toxicity from occurring within the receiving water body due to high salinity, Discharge Specification and Effluent Limitation III.B.2 of Order No. R9-2005-0065 limits average day effluent salinity concentrations to 40 ppt and maximum hour concentrations to 44 ppt.
- Provision VI.C.2.c of Order No. R9-2006-0065 requires the discharger to conduct Salinity and Acute Toxicity Studies to further assess toxicity effects associated with short-term and long-term exposures to higher salinity. The short-term exposure study indicated that no salinity-related acute toxicity effects would occur at a salinity level below 46 ppt. The long-term exposure study will be conducted following commercial operation of the CDP.
- Water quality objectives from the Ocean Plan are included as receiving water limitations in Order No. R9-2006-0065.
- Implementing provisions at Section III. C of the 2005 Ocean Plan require chronic toxicity monitoring for ocean waste discharges with minimum initial dilution factors below 100. Based on the implementing provisions of the 2005 Ocean Plan, a maximum daily effluent limitation of 16.5 TU<sub>c</sub> for chronic toxicity is required.
- There is no requirement to monitor for acute toxicity for discharges with minimum initial dilution factors below 100. However, based on reasonable potential analysis and the uncertainty of the data provided for this new discharge, a water quality-based acute toxicity performance goal of 0.765 TU<sub>a</sub> is included in Order No. R9-2006-0065.

### ATTACHMENT 3

- If chronic toxicity effluent limitations or the acute performance goal established in the Order are exceeded, then, within 15 days of the exceedance, the Discharger shall begin conducting six additional toxicity tests over a 6-week period and until the results of at least two consecutive toxicity tests do not show violations. The Discharger shall provide the results to this Regional Water Board. If the additional weekly toxicity tests indicate that toxicity effluent limitations or performance goals are being consistently violated, the Discharger shall complete a toxicity reduction evaluation (TRE) and Toxic Identification Evaluation (TIE).
- No discernible cumulative effects on marine biology and water quality are projected. Monitoring and Reporting Program No. R9-2006-0065, requires the Discharger to perform periodic receiving water quality monitoring for a variety of constituents to allow continued assessment of overall receiving water effects of the discharge.
- To determine compliance with water quality objectives of the Ocean Plan and to determine if discharges cause significant impacts to water quality within the zone of initial dilution, and beyond the zone of initial dilution, the Monitoring and Reporting Program contained in Order No. R9-2006-0065 establishes ambient semiannual monitoring for temperature, pH, salinity, dissolved oxygen, and transmissivity at 12 receiving water stations at depth intervals of 10 feet.
- Pursuant to 40 CFR 122.48 and Sections 13267 and 13383 of the California Water Code, weekly monitoring and reporting requirements have been established for oil and grease, settleable solids, TSS, turbidity, and pH in order to determine compliance with the effluent limitations contained in Order No. R9-2006-0065. In addition, monitoring and reporting requirements for performance goals based on Table B of the Ocean Plan have been established to determine if the CDP discharge has reasonable potential to exceed water quality objectives contained in Table B of the Ocean Plan. Weekly monitoring for temperature and salinity has been established to compile data to characterize actual effluent characteristics for use in future permitting efforts.
- Monitoring for acute toxicity is required quarterly. Chronic toxicity is required to be monitored monthly.
- To insure compliance with California Water Code Section 13142.5(b) requirements, Provision VI.C.2.e of Order No. R9-2006-0065 required the discharger to develop a plan to minimize entrainment and impingement when the CDP is co-located with the EPS, but the CDP intake requirements exceed the volume of water being discharged by the EPS.

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- The Permit includes a reopener provisions to allow for the San Diego Regional Board to amend permits due to changes in conditions under which the Project was permitted, as well as changes in State and Federal policies, laws and regulations affecting Project operations.

**Flow, Entrainment and Impingement Minimization Plan Requirements (Order R9-2009-0038).** The San Diego Regional Board approved a Flow, Entrainment and Impingement Minimization Plan (the “Minimization Plan”) in May 2009 that modifies Order R9-2006-0065 by adding the following requirements:

- In instances when the CDP’s intake requirements exceed the volume of water being discharged by the EPS, the Discharger will implement and comply with the approved Minimization Plan to ensure that the requirements of Section 13142.5(b) of the Water Code to use the best available site, design, technology and mitigation feasible to minimize the intake and mortality of marine life.
- The best available site, design and technology measures identified by the San Diego Regional Board will be incorporated in the design, construction and operation of the CDP.
- In addition, Discharger is required to create up to 55.4 acres of inter-tidal and sub-tidal marine wetlands to fully mitigate the entrainment and impingement impacts. In March 2011, the San Diego Regional Board approved the Discharger’s recommendation to construct the wetlands mitigation at the south end of San Diego Bay adjacent to the San Diego Marine Refuge operated by the U.S. Fish and Wildlife Service. The basis of the 55.4 acre mitigation requirement was a conservative assumption entrainment and impingement impacts associated with CPD withdrawing 100% of its source water requirements independent of the EPS. In actuality, had the CDP been operating in 2008, 89% of its source water requirements would have been met by the EPS discharge.
- The Minimization Plan includes a Productivity Monitoring Plan component that will be used to confirm that the required wetlands mitigation has achieved the annual fish productivity requirement of 1,715.5 kg/year, which is the CDP impingement projection based on sampling conducted at the EPS during 2004-2005, prior to operation of the CDP. The Plan also requires impingement monitoring to establish impingement levels at the shared intake when the CDP is in co-located operation with the EPS. The results of the impingement monitoring will be used to evaluate whether the 1,715.5

### ATTACHMENT 3

kg/year fish productivity requirement should be adjusted in the next permit cycle.

- If the EPS ceases operations and the Discharger propose to operate the seawater intake structure and outfall independently for the benefit of the CDP, such independent or stand-alone operation will require additional San Diego Regional Board review to ensure that CDP operations comply with the requirements of Water Code Section 13142.5(b) by employing any additional and/or better design or technology features that were not feasible when the EPS was in Operation.

ATTACHMENT 4

# Ocean Outfall/Diffuser System



ATTACHMENT 5

**New Ocean Outfall with High Energy Diffuser**

Total Capacity =	100 MGD
Length of 72" Outfall Pipe =	8700 feet
Land Needed for Diversion/Outfall Connection Structure =	0.5 acres
Cost of Installation of Outfall Tunnel =	\$80M
Cost of Installation of Pipe =	\$50M
Cost of Installation of Diversion and Diffuser Structures =	\$15M
<b>Total Construction (Direct) Costs =</b>	<b>\$\$\$140M</b>
<b>Indirect Costs</b>	
Land Acquisition	\$1.5M
Engineering, Design, and Procurement @25% =	\$35M
Environmental Mitigation @ 15% =	\$21M
Contingency @ 20% =	\$28M
<b>Total Indirect Costs =</b>	<b>\$86M</b>
<b>Total Project EPC Costs =</b>	<b>\$226M</b>

**ATTACHMENT 6**

**CARLSBAD SEAWATER DESALINATION PROJECT**

**SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD**

**REGION 9, SAN DIEGO REGION**

**ORDER NO. R-9-2006-0065**

**NPDES NO. CA0109223**

**SALINITY RELATED TOXICITY TRESHOLD**

**FOR**

**SHORT-TERM EXPOSURE**

**October 2, 2007**



## ATTACHMENT 6

### EXECUTIVE SUMMARY

The Carlsbad seawater desalination project (CDP) is proposed to be located adjacent to the Encina Power Generation Station (EPS) and when constructed, will use the power plant cooling water system as source water for production of 50 MGD of fresh drinking water and for dilution of the concentrate seawater from the desalination process.

The San Diego Regional Water Quality Control Board (Regional Board) NPDES Permit Order R9-2006-0065 for the CDP establishes salinity limits of the blended desalination plant/cooling water discharge of 40/44 ppt (daily/hourly average). These permit salinity limits were established based on a conservative analysis of the desalination plant discharge completed during the environmental impact report preparation phase of the project. In order to more accurately determine the salinity threshold at which the desalination plant concentrate can be discharged safely, Section VI.2.c.1 of the adopted NPDES Permit order requires the discharger to conduct a study using CDP pilot plant effluent to assess short-term exposure of test species to salinity concentrations that range from 36 to 60 parts per thousand (ppt).

The purpose of this study is to determine the threshold of concentration of total dissolved solids (TDS or salinity) of the discharge from the CDP below which short-term exposure (30 minutes to 24 hrs) of standard test organisms to this discharge does not cause acute toxicity. The study was completed to fulfill Poseidon Resources obligations under the requirements of Order No. R9-2006-0065 of August 16, 2006, of the San Diego Regional Water Quality Control Board, Section VI.C.2.c.1: "Salinity-Related Toxicity Threshold for Short-Term Exposure". The toxicity testing was completed in accordance of Study Plan reviewed and approved by the Regional Board staff (see Attachment 1). The test results are provided in Attachment 2 and indicate the following:

- The NPDES permit daily average and maximum hourly salinity limitations of 40 ppt and 44 ppt are conservative.
- The NPDES permit TUa Performance Goal of 0.765 is not exceeded until salinity reaches 48 ppt and is safely met at salinity of 46 ppt or less.
- Current NPDES permit average hourly salinity limitation of 44 ppt is also very conservative. The test data indicates that no mortality effect was observed for a period of 2 hours at discharge salinity of 60 ppt.

Concentrate of salinity of 46 ppt and acute toxicity level TUa of 0.65 complies with a reasonable margin of safety with the NPDES acute toxicity TUa performance goal of 0.765. Therefore, 46 ppt of concentrate salinity level could be considered as an acceptable and conservative salinity-related toxicity threshold for short-term exposure.

## ATTACHMENT 6

### CHAPTER 1 INTRODUCTION

#### 1.1 STUDY PURPOSE

On August 16, 2006 the San Diego Regional Water Quality Control Board (RWQCB) adopted Order NO. R9-2006-0065 for Poseidon Resources Corporation's Carlsbad Desalination Project discharge to the Pacific Ocean via the Encina Power Station discharge channel. Section VI.C.2.c.1 of the adopted order requires the Discharger to complete study that determines:

1) *Salinity-Related Toxicity Threshold for Short-Term Exposure*

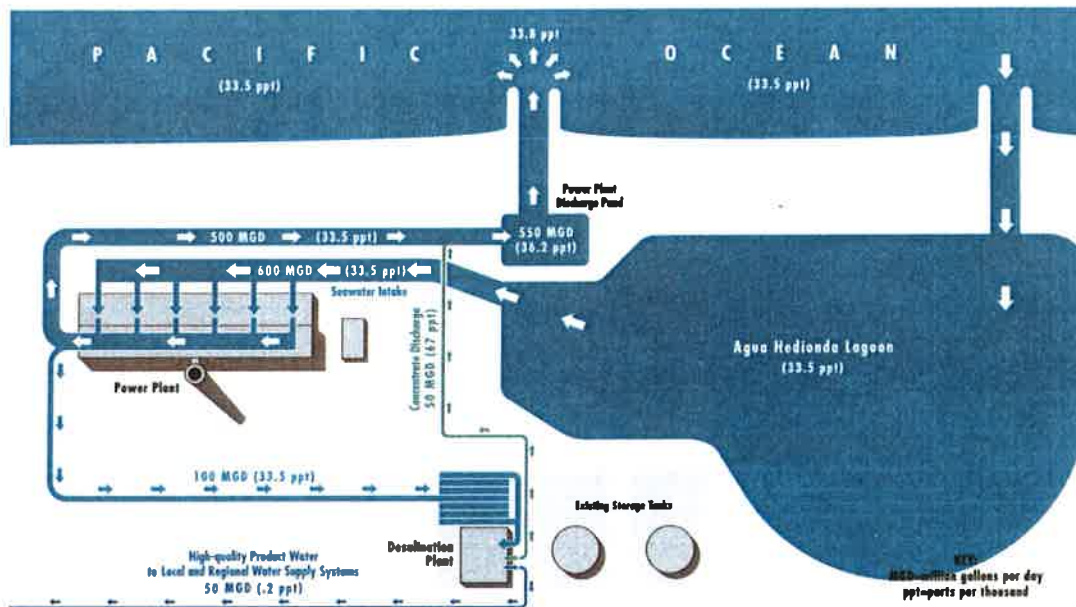
*The Discharger shall conduct a study using CDP pilot plant effluent to assess short-term exposure of test species to salinity concentrations that range between 36 and 60 ppt. The Discharger shall submit a study plan for the short-term toxicity threshold evaluation study within 180 days of adoption of this order. The study plan shall identify how pilot plant effluent samples are to be collected, the range of salinity concentrations to be evaluated, how salinity concentrations are to be adjusted, short-term exposure periods to be assessed, and how short-term exposure tests are to be conducted. The short-term toxicity threshold evaluation shall be completed and approved by the Executive Officer prior to CDP startup.*

This Short-Term Exposure Threshold (STET) Study is developed in fulfillment of the above-stated requirements. The main purpose of the STET study is to determine the threshold of concentration of total dissolved solids (TDS or salinity) of the discharge from the Carlsbad Seawater Desalination Plant (CDP) below which a short-term exposure (30 minutes to 24 hours) of standard test organisms to this discharge does not cause acute toxicity.

#### 1.2 DESALINATION PLANT DISCHARGE CONFIGURATION AND OPERATIONS

The seawater desalination plant intake and discharge facilities would be located adjacent to the Encina Power Station (EPS). A key feature of the proposed design is the direct connection of the desalination plant intake and discharge facilities to the discharge canal of the power generation plant. This approach allows using the power plant cooling water as both source water for the seawater desalination plant and as a blending water to reduce the salinity of the desalination plant concentrate prior to the discharge to the ocean. Figure 1-1 illustrates the configuration of the desalination facility and EPS intake and discharge facilities.

## ATTACHMENT 6



**Figure 1-1 –Carlsbad Desalination Plant and Encina Power Station**

As shown on Figure 1-1, under typical operational conditions when both the desalination facility and the power plant are operating approximately 600 MGD of seawater enters the power plant intake facilities and after screening is pumped through the plant's condensers to cool them and thereby to remove the waste heat created during the electricity generation process.

The volume of cooling water passing through the power plant intake power station at any given time is dependent upon the number of cooling water pumps (CWPs) and service water pumps that are in operation. With all of the pumps in operation, the maximum permitted power plant discharge volume is 857 MGD or about 595,000 gallons per minute (gpm) (Year 2006 NPDES Permit No. CA0001350). This discharge encompasses both the cooling water pumps (794.9 MGD) and the service water pumps (61.2 MGD).

As electrical demand varies, the number of generating units in operation and the number of cooling water pumps needed to supply those units will also vary. Over the period of 2002 to 2005 the EPS has reported combined discharge flows ranging from 99.8 MGD to 794.9 MGD with a daily average of 600.4 MGD. Over the 20.5 year period of January 1980 to mid 2000 the average discharge flow was 550 MGD and ranged from 200–808 MGD. Through August 30, 2007 the average annual power plant cooling water discharge flow was over 200 MGD.

The Carlsbad desalination plant intake structure would be connected to the end of the power plant discharge canal and would divert an average of 104 MGD of the cooling water for production of fresh water. Approximately 50 MGD of the seawater would be desalinated via reverse osmosis and conveyed for potable use. The remaining 50 MGD would have salinity approximately two times higher than that of the ocean water (67 ppt vs. 33.5 ppt). This seawater concentrate would be returned to the power plant discharge canal downstream of the point of

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intake for blending with the cooling water prior to conveyance to the Pacific Ocean. Under typical conditions, when both the desalination facility and the power plant are operating, the blend of 500 MGD of cooling water and 50 MGD of concentrate would have discharge salinity of 36.2 ppt, which is within the 10 percent natural fluctuation of the ocean water salinity (36.9 ppt) in the vicinity of the existing power plant discharge.

The Regional Board Order R9-2006-0065 establishes a salinity limit of the blended desalination plant/cooling water discharge of 40/44 ppt (daily/hourly average). The minimum power plant cooling water discharge flow needed to comply with this permit requirement is 304 MGD. Such cooling water discharge flow is planned to be maintained at all times, including during periods of temporary or permanent shutdown of power plant operations.

### **1.3 SHORT-TERM DISCHARGE SALINITY THRESHOLD RATIONALE**

Under normal operations the salinity concentration of the blended discharge of cooling water and desalination plant concentrate is projected to be less than or equal to 40 parts per thousand (ppt). The operation of the intake pumps of the desalination plant will be interlocked with the power plant intake pumps. As a result a power plant intake pump shutdown will automatically trigger desalination plant intake pump shutdown. After pump shutdown, however, it takes approximately 15 to 60 minutes to empty the desalination plant concentrate line and the power plant discharge canal. The instantaneous salinity concentration of the blended discharge may exceed 40 ppt during this short shut-down interval. To accommodate such short-term events when salinity of the blended concentrate may exceed the average daily TDS limit of 40 ppt during shut-down operations, the desalination plant NPDES permit establishes an average hourly salinity limit of 44 ppt.

Initial toxicity testing performed as part of Poseidon's NPDES application indicated that a short-term salinity of 44 ppt would not result in any harm to aquatic or benthic organisms. The purpose of STET Study is to confirm the validity of the 44 ppt salinity permit threshold and to assess the suitability of changing this threshold based on acute toxicity testing of the blended discharge for a salinity range between 36 and 60 ppt. The standard acute toxicity test was selected to establish the short-term salinity threshold, because this test will characterize effects of the short-term exposure of the blended discharge on aquatic life in the area of the discharge.

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### CHAPTER 2

#### TOXICITY TESTING PROCEDURES AND CONDITIONS

The STET Study consisted of series of acute effluent toxicity bioassay tests of diluted desalination plant concentrate of salinity in a range of 36 ppt to 60 ppt and time of exposure of standard test organisms to the diluted concentrate in a range of 1 hour to 96 hours. As noted in Chapter 1, actual desalination shut-down operations may result in effluent salinities of up to 44 ppt for an hour or less. The proposed range of STET test salinities and exposure times thus represent a range of salinities and exposure times significantly in excess of actual discharge conditions. A detailed Testing Plan for the STET Study is included in Attachment 1.

##### 2.1. TEST PROCEDURE

As per the requirements of the Carlsbad Seawater Desalination Plant NPDES Permit (Attachment E, Monitoring and Reporting Program, Section V. A.) the acute effluent toxicity bioassay tests will be performed in accordance with the standard test procedures established by the USEPA guidance manual, Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5<sup>th</sup> Edition, October 2002 (EPA-821-R-02-012).

##### 2.2. TEST SALINITIES

A 24-hour composite sample of seawater desalination plant concentrate was collected at the Carlsbad seawater desalination pilot plant and be diluted to nominal test salinities of: 36 ppt, 38 ppt, 40 ppt, 42, ppt, 44 ppt, 46 ppt, 48 ppt, 50 ppt, 52 ppt, 54 ppt, 56 ppt, 58 ppt and 60 ppt. Filtered seawater from the Carlsbad pilot plant was used to dilute the concentrate to the test salinity levels indicated above. In addition, a control sample of standard seawater salinity was tested for comparison.

##### 2.3. TEST ORGANISM

Topsmelt (*Atherinops affinis*) was used as a test organism because it is the only EPA-approved acute effluent toxicity test organism that may be present in the immediate vicinity of the desalination plant discharge. Since topsmelt is the marine organism also used to complete the EPGS acute effluent toxicity bioassay tests, the use of this organism for the STET test facilitates continuity and comparability of the EPGS and desalination plant discharge toxicity test results.

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### 2.4. TEST IMPLEMENTATION

The STET acute toxicity testing was completed by a certified bioassay laboratory (Weston Solutions, Inc., Carlsbad Office) during the period of January 4 to January 9, 2007. This laboratory was selected because it is currently used by the EPGS staff to complete the power plant's cooling water effluent toxicity testing.

Sample seawater desalination plant concentrate was diluted with filtered seawater collected at the pilot Carlsbad seawater desalination plant to 13 different test salinities. The filtered seawater was also tested to confirm that the dilution water did not cause toxicity. To simulate what would occur if the power plant shuts down the fish was acclimated for final test salinities over the first 24 hrs of the test. In addition to the normal survival counts included in the standard acute toxicity testing procedure, additional counts were performed at 30 minutes, 1 hour, 2 hours, 4 hours and 12 hours.

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CHAPTER 3 – STUDY RESULTS

The results of the Salinity and Acute Toxicity Study are provided in Attachment 2 and summarized in Table 3-1 below.

TABLE 3-1

SALINITY AND ACUTE TOXICITY OF DESALINATION PLANT CONCENTRATE

Concentrate Salinity (ppt)	Test Species Survival (percent of total)	Acute Toxicity of Concentrate TUa <sup>(1,2)</sup>
33.5 (Control)	100	0.00
36	95	0.41
38	90	0.59
40	95	0.41
42	97.5	0.23
44	85	0.69
46	87.5	0.65
48	80	0.77
50	55	0.97
52	62.5	0.93
54	45	1.02
56	55	0.97
58	65	0.91
60	37.5	1.06

Notes: (1) TUa calculated as:  $\log(100 \text{ percent survival})/1.7$ ;

(2) Desalination NPDES Permit TUa Performance Goal = 0.765.

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As indicated in Attachment 2, the No Observed Effect Concentration (NOEC) of the test organisms occurred at 42 ppt of concentrate salinity. The Lowest Observed Effect Concentration (LOEC) was found to be 44 ppt. The lethal concentration for 50 percent of the population (LC50) was 58.57 ppt. In addition, the No Observed Effect Time (NOET) for 60 ppt concentration was 2 hours, while the Lowest Observed Effect Time (LOET) for the 60 ppt concentration was 4 hours.

Analysis of the toxicity testing data presented in Attachment 2 and summarized in Table 3-1 points to the following key conclusions:

- The existing NPDES permit daily average salinity limitation of 40 ppt is conservative.
- The NPDES permit TUa Performance Goal of 0.765 is not exceeded until salinity reaches 48 ppt and is safely met at salinity of 46 ppt or less.
- Current NPDES permit average hourly salinity limitation of 44 ppt is also very conservative. The test data indicates that no mortality effect was observed for a period of 2 hours at discharge salinity of 60 ppt.

Concentrate of salinity of 46 ppt and acute toxicity level TUa of 0.65 complies with a reasonable margin of safety with the NPDES acute toxicity TUa performance goal of 0.765. Therefore, 46 ppt of concentrate salinity level could be considered as an acceptable and conservative salinity-related toxicity threshold for short-term exposure.



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**ATTACHMENT 1**

**TOXICITY TESTING STUDY PLAN**

## ATTACHMENT 6

### CARLSBAD SEAWATER DESALINATION PLANT NPDES NO. CA0109223

#### STUDY PLAN

#### FOR EVALUATION OF SALINITY-RELATED TOXICITY TRESHOLD FOR SHORT-TERM EXPOSURE TO DESALINATION PLANT DISCHARGE

#### STUDY PURPOSE

The purpose of this Short-Term Exposure Threshold (STET) Study is to determine the threshold concentration of total dissolved solids (TDS or salinity) of the discharge from the Carlsbad seawater desalination plant below which a short-term exposure (30 minutes to 24 hours) of standard test organisms to this discharge does not cause acute toxicity.

The study is proposed to fulfill Poseidon Resources Corporation's obligations under the requirements of Order No. R9-2006-0065 of August 16, 2006, of the San Diego Regional Water Quality Control Board, Section VI.C.2.c.1: "Salinity-Related Toxicity Threshold for Short-Term Exposure".

#### BACKGROUND

The Encina Power Generation Station (EPGS) has been selected as the site for the development of the Carlsbad Seawater Desalination Plant. The source water for the 50 MGD seawater reverse osmosis (SWRO) desalination plant will be collected from the existing cooling water discharge canal of the power plant. The power plant withdraws cooling water from the Pacific Ocean via the Agua Hedionda Lagoon. The concentrate and the treated waste filter backwash water from the desalination plant will be discharged into the existing cooling water discharge channel downstream of the point of interconnection for complete mixing with the cooling water discharge from the power plant prior to its ultimate disposal to the ocean.

Under normal operations the salinity concentration of the blended discharge of cooling water and desalination plant concentrate is projected to be less than or equal to 40 parts per thousand (ppt).

The operation of the intake pumps of the desalination plant will be interlocked with the power plant intake pumps. As a result a power plant intake pump shutdown will automatically trigger desalination plant intake pump shutdown. After pump shutdown, however, it takes approximately 15 to 60 minutes to empty the desalination plant concentrate line and the power plant discharge canal. The instantaneous salinity concentration of the blended discharge may exceed 40 ppt during this short shut-down interval. To accommodate

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such short-term events when salinity of the blended concentrate may exceed the average daily TDS limit of 40 ppt during shut-down operations, the desalination plant NPDES permit establishes an average hourly salinity limit of 44 ppt.

Initial toxicity testing performed as part of Poseidon's NPDES application indicated that a short-term salinity of 44 ppt would not result in any harm to aquatic or benthic organisms. The purpose of STET Study is to confirm the validity of the 44 ppt salinity permit threshold and to assess the suitability of changing this threshold based on acute toxicity testing of the blended discharge for a salinity range between 36 and 60 ppt. The standard acute toxicity test was selected to establish the short-term salinity threshold, because this test will characterize effects of the short-term exposure of the blended discharge on aquatic life in the area of the discharge.

### STUDY PROTOCOL

The proposed STET Study will consist of series of acute effluent toxicity bioassay tests of diluted desalination plant concentrate of salinity in a range of 36 ppt to 60 ppt and time of exposure of standard test organisms to the diluted concentrate in a range of 1 hour to 96 hours. As noted above, actual desalination shut-down operations may result in effluent salinities of up to 44 ppt for an hour or less. The proposed range of STET test salinities and exposure times thus represent a range of salinities and exposure times significantly in excess of actual discharge conditions.

#### Test Procedures

As per the requirements of the Carlsbad Seawater Desalination Plant NPDES Permit (Attachment E, Monitoring and Reporting Program, Section V. A.) the acute effluent toxicity bioassay tests will be performed in accordance with the standard test procedures established by the USEPA guidance manual, Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5<sup>th</sup> Edition, October 2002 (EPA-821-R-02-012).

#### Test Salinities

A 24-hour composite sample of seawater desalination plant concentrate will be collected at the Carlsbad seawater desalination pilot plant and be diluted to nominal test salinities of: 36 ppt, 38 ppt, 40 ppt, 42, ppt, 44 ppt, 46 ppt, 48 ppt, 50 ppt, 52 ppt, 54 ppt, 56 ppt, 58 ppt and 60 ppt. Filtered seawater from the Carlsbad pilot plant will be used to dilute the concentrate to the test salinity levels indicated above. In addition, a control sample of standard seawater salinity will be tested for comparison.

#### Test Organism

Topsmelt (*Atherinops affinis*) is planned to be used as a test organism. Topsmelt is proposed for this test because it is the only EPA-approved acute effluent toxicity test organism that may be present in the immediate vicinity of the desalination plant discharge. Since topsmelt is the marine organism also used to complete the EPGS acute effluent toxicity bioassay tests,

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the use of this organism for the STET test will facilitate continuity and comparability of the EPGS and desalination plant discharge toxicity test results.

The bioassay laboratory will be responsible for the supply, delivery and use of the test organisms. Each batch of test organisms will be subjected to salinity concentrations (see above) ranging from 36 ppt to 60 ppt. To simulate receiving water conditions under shut-down operations (in which salinity levels may temporarily gradually increase over a period of 15 to 45 minutes), salinity concentrations will be added to the test tanks over a period of short intervals (less than one hour) until the target salinity is reached.

### **Survival Count Times**

Under the standard acute effluent toxicity bioassay test procedure, test organism survival counts are taken at the beginning of the test (0 hrs) and after 24, 48, 72 and 96 hours of effluent exposure. Additionally, in order to reflect the fact that elevated discharge salinity conditions are not expected to occur for longer than 60 minutes, the additional organism survival counts will be taken at 1 hour, 2 hours, 4 hours, and 12 hours after the initiation of the tests.

The tests will be completed by a certified laboratory specialized in such toxicity tests (Weston Solutions, Inc., Carlsbad office). This laboratory was selected because it is currently used by the EPGS staff to complete the power plant's cooling water effluent toxicity testing.

### **Source and Collection of Sample of Concentrate and Dilution Seawater**

As indicated previously, for the purposes of the toxicity testing, the following samples are needed: (1) desalination plant concentrate; (2) dilution seawater not affected by/mixed with the EPGS cooling water discharge. Representative composite samples of the seawater desalination plant concentrate will be obtained from Poseidon's Carlsbad seawater desalination pilot plant.

The Carlsbad pilot plant is a 25 gpm seawater desalination facility located at the Encina power plant site. The plant consists of the same treatment facilities and uses the same chemicals as these planned to be used at the full-scale Carlsbad desalination plant. Under average conditions, the pilot desalination plant intake pump diverts up to 55 gpm of seawater from the Carlsbad power plant cooling water discharge. The intake seawater is treated using a pretreatment filtration system followed by cartridge filter and reverse osmosis (RO) seawater desalination system. The basic design criteria of the pilot plant are the same as these used for the full-scale facility. The pilot plant uses the same type of cartridge filters, and number and type of reverse osmosis membranes as the full-scale facility. Typically, the pilot project generates 70 to 80 gpm of filtered seawater of ambient ocean salinity (i.e., 32 to 34 ppt), and 35 to 40 gpm of concentrate that has salinity approximately two times higher than ambient salinity (i.e., 64 to 68 ppt).

For the purposes of this test one 24-hour composite sample of desalination plant concentrate and one 24-hour composite sample of filtered effluent will be collected from sampling ports at the pilot plant. The concentrate and filtered water composite samples will consist of

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minimum of 4 individual grab samples collected over every 8 hours over the same 24-hour period. Alternatively, the two composite samples may be collected using automatic grab samplers connected to the filter effluent and concentrate sampling ports.

### **TEST IMPLEMENTATION, RESULTS AND STUDY REPORT**

The proposed STET Study will be implemented within six weeks from the approval of this Study Plan. The bioassay test results will be summarized in a report, which will be submitted for review to the San Diego RWQCB staff. This report will also contain an interpretation of the test results and recommendations regarding the average hourly salinity limitation included in the current permit.