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Dr. Charles Cheng
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

RE: Comments on the February 12, 2007 proposed Flow, Entrainment, and Impingement Minimization Plan (the Plan) for the proposed Poseidon desalination facility in Carlsbad, California.

Dear Dr. Cheng:

Thank you for the opportunity to comment on the above-referenced document (the Plan), and thank you for the additional time you provided for us to prepare these comments. The Plan is required pursuant to the Regional Board's Order #R9-2006-0065. We understand that Regional Board staff will review the adequacy of the proposed Plan and will possibly require it be revised before it is considered by the Board. We have several significant concerns about the proposed Plan and recommend that it be substantially revised before the Board completes its review.

We are providing these comments pursuant to the Coastal Commission's shared jurisdiction with the Board for matters related to uses of and impacts to the state's coastal waters, pursuant to the Coastal Act and the Porter-Cologne Water Quality Control Act. The two Acts have similar requirements related to entrainment – one requires the minimization of the adverse effects of entrainment, and the other requires the use of the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of marine life – and we believe incorporating our comments into a revised Plan will help ensure the project's conformity to both Acts. Concurrent with our review of this proposed Plan, we are also reviewing a coastal development permit application for the proposed desalination facility. While we recognize the potential for desalination to provide an additional water source for the San Diego area, the proposed facility and Plan do not yet include the necessary design measures or analyses needed to ensure conformity to either Act. We have several significant concerns about the proposed facility that have not yet been addressed, including some that we recommend be addressed as part of the Regional Board's consideration of this Plan.

Some of the Plan's shortcomings illustrate the key problems associated with the proposed facility's dependence on a power plant cooling system that is likely to shut down soon. When the Plan addresses adverse impacts at one end of the system – i.e., entrainment and impingement – it creates others at the other end – i.e., unacceptably high concentrations of salinity and other compounds in the discharge. Even if it may sometimes makes sense to co-locate a desalination facility with an operating once-through cooling system, the advantages of co-location largely disappear when the power plant's cooling system shuts down. Several of our comments below relate to this problem.

Additionally, the proposed Plan would represent a significant departure from the CEQA analysis that has already occurred for this proposed project. For example, the Plan's Attachment 6 – Additional Responses to Comments on the Final EIR-03-05 For the Precise Development Plan and Desalination Plant Project SCH#2004041081 (June 13, 2006) – shows that the EIR evaluated discharges of up to only about 40 ppt salinity under the "No Power Plant Operations" scenario. Adoption of the Plan as proposed may require additional CEQA review, as several of the impacts that would result from implementing the proposed Plan were not addressed in the project's EIR.

Main Issues:

For several reasons, the proposed Plan does not provide enough information to ensure conformity to either the Coastal Act or the Porter-Cologne Act. Further, it does not adequately respond to the requirements of the Board's Order to assess feasible methods and mitigation measures to reduce impacts to marine organisms. Our main issues of concern include:

1) Inadequate analysis of cumulative effects on Agua Hedionda Lagoon: The Plan does not adequately describe the consequences of its proposed operating scenarios on the Lagoon.
2) Inadequate description of discharge-related impacts: The Plan does not adequately address potential discharge-related impacts. The proposed discharge would likely violate chronic toxicity limits and cause cumulative impacts.
3) Inadequate consideration of alternatives: The Plan evaluates only minor variations of a single option (i.e., various operating scenarios of existing power plant pumps) and leaves out other less environmentally damaging options that appear feasible.
4) Inadequate biological data: The biological data used in the Plan are out-of-date or incomplete and are therefore not adequate for determining potential impacts.
5) Inadequate or incomplete impingement analysis: The Plan uses out-of-date biological data for its impingement analysis and does not evaluate the necessary range of feasible mitigation measures for reducing impingement.
6) Inadequate or incomplete entrainment analysis: The Plan does not fully describe the entrainment analysis used and erroneously downplays the entrainment effects likely to occur if the Plan were to be implemented.

These issues are each discussed in greater detail below.

1) Inadequate analysis of cumulative effects on Agua Hedionda Lagoon: The purpose of the Plan is to identify how the proposed desalination facility would reduce its entrainment and impingement impacts, as required by both Acts noted above. However, the approach proposed in the Plan raises larger questions about the facility's potential effects on Agua Hedionda Lagoon. The Lagoon in its current configuration has been largely formed and maintained by the power plant's water use along with the ongoing dredging and the presence of the entrance jetties needed to continue that water use. The intake's effects include the ongoing loss of marine life, increased sedimentation, a different hydrologic regime in the Lagoon, and a different set of beneficial uses than what might otherwise be present. Some of the Lagoon's existing beneficial uses appear to be dependent on those effects and some of its uses would likely benefit by ending the effects. But for this proposed desalination facility, these effects would end within the next few years.

Although Chapter 6 of the Plan touches on some of these issues, it does not adequately describe the consequences of the proposed changes or other alternatives on the Lagoon's uses. There are a number of open questions about how the Lagoon will be managed in the future – whether it will include increased or decreased restoration possibilities, whether it will be subject to increased or decreased dredging, whether the entrance jetties will be altered, etc. A decision about the appropriateness of the operating scenarios proposed in this Plan should not be made without a larger determination about the fate of Agua Hedionda Lagoon. These larger issues are being considered in part through at least two other current review processes – Poseidon's request for leases from the State Lands Commission and Poseidon's coastal development permit application to the Coastal Commission.

We recommend, therefore, that the Plan be revised to more fully describe how its proposed operating scenarios as well as other alternatives would affect the Lagoon's beneficial uses. We also recommend the Regional Board not make a final decision on this proposed Plan until after these larger issues are at least partially resolved through these other two reviews. This approach should not delay the proposed project, since the final Plan would not need to be implemented until after the facility is constructed and operating, which would not occur until these other reviews are complete. In fact, decisions by the State Lands Commission and Coastal Commission could result in a different project design than is currently reflected in the Plan.

2) Inadequate description of discharge-related impacts: It appears that the discharge proposed in the Plan may violate chronic toxicity standards and result in cumulative effects to nearby nearshore waters and beaches. Additionally, the Plan does not adequately address the effects of other high concentrations likely to be present in the discharge.

Section 2.2 of the Plan states that two factors were used to determine minimum flow volumes – first, keeping discharge concentrations below levels that would be "acutely toxic" for marine organisms in the area; and second, ensuring adequate mixing within the zone of initial dilution (ZID). The Plan needs to also identify how to keep discharge concentrations below levels of chronic toxicity. Even the limited data available suggests that Poseidon's proposal to allow discharges of up to 50 ppt would be well above the No Observed Effect Concentration (42 ppt) used as a basis for determining chronic toxicity. The Plan must identify, in addition to salinity, concentrations of other compounds that would be present in the discharge. These include metals, cleaning agents, and naturally occurring substances in seawater that may be harmful to marine life at concentrations above their natural background levels. The Plan should also identify pH levels of the proposed discharges and show whether they meet the Ocean Plan requirement of no more than 0.2 unit change from background.

We have requested as part of our coastal development permit review that Poseidon identify the extent of nearshore waters in which concentrations would exceed the natural range of variability (e.g., salinity about 10% over average background concentrations). The operating scenarios described in the Plan would result in levels above natural concentrations in areas ranging from dozens to hundreds of acres of the seafloor. While some organisms may be able to tolerate some of the higher salinity levels, the scenarios proposed in the Plan would likely result in a long-term habitat shift, which would likely require mitigation.

These scenarios would also likely result in concentrations of other constituents (e.g., copper, boron, etc.) above their ranges of natural variability, which could result in other chronic effects as well as cumulative impacts that are not addressed in the proposed Plan. Further, the proposed discharge and the ZID would be located immediately adjacent to the beach, but the Plan does not identify what effects this mix of high salinity, dead biomass, and high concentrations of other constituents may have on human health. We recommend that the Plan be revised to address these issues.

Additionally, and as noted below, the Plan's proposed discharge and mixing scenarios are based only on varying operations of the existing power plant pumps. The Plan should be revised to consider the use of new, variable speed pumps whose operation could be optimized to both minimize entrainment and allow the necessary level of dilution.

3) Inadequate consideration of alternatives: The Plan's flow reduction proposals are based only on minor variations of a single option – that is, to run the existing power plant pumps under various operating scenarios. The Plan does not include any of several options that appear to be feasible ways to reduce or eliminate entrainment and impingement and simultaneously resolve some of the proposed project's discharge-related impacts. These options include:

- Replace the existing power plant pumps: The proposed Plan is based on the use of the existing pumps used by the power plant. However, the power plant owner has announced plans to relocate the existing plant, which suggests that Poseidon should consider replacing the existing pumps with more efficient variable speed pumps of a size appropriate for the desalination facility. Rather than depend on the limited operational conditions available from the existing pumps, the facility could select new pumps to optimize water production and entrainment reduction.

- Construct a smaller facility: The project as proposed would be the largest seawater desalination facility in the country, and the Plan assumes that the facility must produce 50 MGD. However, given that other desalination proponents have found it feasible to build or propose smaller facilities, and recognizing that a smaller facility of this design at this location would further reduce entrainment impacts, the Plan should also consider whether a smaller facility would be feasible and would cause fewer adverse environmental effects. We have asked as part of our coastal development permit review that Poseidon provide information needed to help determine the feasibility of a smaller facility, and we recommend the Plan be revised to include this as an option.

- Avoid entrainment and impingement entirely by using subsurface intakes: We have asked as part of our review of Poseidon's coastal development permit that it provide site-specific information to help determine whether subsurface intakes may be feasible, but we have not yet received this information. This option could also include the use of subsurface discharges, which may alleviate all or some of the adverse effects of high salinity in the water column.

- Reduce water intake through use of a zero-discharge facility: A zero-discharge facility would not require the additional water for dilution described in the Plan. It may be feasible for the facility to withdraw only that seawater needed to produce potable water and by a zero-discharge design avoid the need for dilution, which could substantially reduce entrainment/impingement.

These options, or combinations of these options, appear to be feasible and less environmentally damaging than the currently proposed project, so we recommend they be incorporated into a revised Plan.

4) Inadequate biological data: Much of the biological data used in the Plan are out-of-date or incomplete so are not adequate for determining potential impacts. For example, the Plan describes impingement impacts relying on data collected in 1980. These quarter-century old data do not adequately describe current biological conditions and should not serve as the basis for the Plan's analysis. Similarly, the Plan does not fully describe the entrainment study used and does not include the source water determination needed to calculate the loss of marine biological productivity that would be caused by the proposed facility.

The Plan therefore needs to incorporate more recent impingement data and provide complete information about the entrainment models and analyses used (both issues are described in more detail below). Additionally, the concerns expressed above about the likely chronic toxicity and cumulative impacts of the proposed discharge strongly suggest that additional extensive biological tests are needed to properly characterize the discharge and its effects.

5) Inadequate or incomplete impingement analysis: The Plan describes impingement losses that would occur under the operating scenarios mentioned above by comparing them to losses during maximum and average power plant operations (794.92 and 600.4 MGD, respectively). The proportional reductions in losses range from about 49 to 80%. However, reductions at the higher end of this range would result in discharges exceeding chronic toxicity levels and causing cumulative impacts – that is, under the Plan's proposed approach, the more impingement is reduced, the more significant the adverse effects of the discharge.

Additionally, most of the operating scenarios described in the Plan would result at times in velocities greater than 0.5 feet per second (fps). Attachment 4 of the Plan shows that 51 of the 56 operating conditions (i.e., high and low tide velocities both in-channel and through-screen) would result in velocities greater than 0.5 fps, with velocities under some conditions being five or six times higher.[1] Under Clean Water Act (CWA) §316(b), intakes with velocities lower than 0.5 fps are considered to cause minimal impingement. Although the desalination facility operating on its own would not be subject to this section of the CWA, 0.5 fps is still considered the maximum velocity for this type of intake to avoid impingement impacts. The Plan needs to be revised to focus on ways to reduce velocities to below this level. Further, as noted above, the analysis is based on impingement data from 1980 and it assumes only that the proposed facility would use the existing power plant pumps.

[1] We note that Attachment 4 of the Plan shows that the majority of operating conditions would result in velocities greater than 0.5 fps; however, Attachment 5 of the Plan states that operations under the No Power Plant Alternative would not exceed 0.5 fps. This difference needs to be corrected in a revised Plan.

We therefore recommend the Plan be revised to incorporate more recent biological data and to include consideration of new pumps that would maintain velocities of less than 0.5 fps. Additionally, as noted above, the potential use of subsurface intakes would completely eliminate the proposed project's impingement impacts, so a revised Plan should also describe feasible alternative intakes.

6) Inadequate or incomplete entrainment analysis: Similar to a problem identified above, the Plan's approach to reducing entrainment impacts are limited to variations of just a single alternative – i.e., varying the operation of the existing power plant pumps. Additionally, and as noted above with the Plan's approach to reducing impingement, the highest entrainment reductions would be associated with the most significant adverse discharge effects.

The Plan states that the proposed desalination facility would cause "insignificant" entrainment losses, but then states that entrainment would kill up to a third of at least one species in the source water and would also kill lower numbers of at least two other species. The document further states that because the species are abundant and ubiquitous, the losses can be dismissed; however, this conclusion is not based on the analyses used and accepted for the most recent entrainment studies done for this type of intake structure here in California.[2] The "state-of-the-art" study uses samples collected over at least a one-year period and applies the Empirical Transport Model (ETM) to determine the loss of productivity caused through entrainment. While the Plan cites a study using part of this methodology, it does not provide the complete information needed to determine the type and extent of entrainment impacts.

The Plan also downplays the proposed project's entrainment impacts by stating that larval fish lost to entrainment "are not removed from the ocean, but are returned to supply the ocean's food webs..." This statement appears to suggest that dead larval biomass released along with a high salinity discharge into nearshore ocean waters would perform the same ecosystem function as the living larvae found in Agua Hedionda. Again, this statement does not accurately describe the impacts associated with entrainment and it should not be included in the Plan's analysis.

The Plan needs to be revised to fully describe the entrainment analysis used and needs to use the Empirical Transport Model to identify the loss of productivity ("Area of Production Foregone") that would be caused by the desalination facility's entrainment. Although the Plan partially describes Poseidon's entrainment study, the description does not include the source water determination needed to determine the APF, which serves as a basis for identifying impacts and necessary mitigation measures. We have requested Poseidon provide this type of analysis as part of its coastal development permit application. This study would need to be similar to other recent entrainment studies completed by several Regional Boards, including the study required by the San Diego Board for the South Bay Power Plant in Chula

[2] As noted above, we recognize that the proposed desalination facility operating on its own would not include a cooling water intake structure and would therefore not be subject to regulation under CWA Section 316(b). However, because its proposed intake and assumed adverse impacts would be similar to those caused by the cooling water structures regulated by that regulation, it is reasonable to apply many of the same standards and guidance as Best Professional Judgment.

Vista. We note that all of the studies for California coastal power plants completed over the past decade have concluded that the intakes, several of which have flows in the same range as the proposed desalination facility, cause significant entrainment impacts. Therefore, until the necessary study is completed or fully documented, it is not possible to accurately determine what entrainment effects would result from the proposed facility.

Closing

In sum, we recommend the proposed Plan be significantly revised to incorporate our comments. We believe a properly revised Plan would be useful not only to help ensure conformity to the Regional Board's requirements but to help the proposed project move forward with its coastal development permit application.

Again, thank you for the opportunity to comment. I would be happy to answer any questions you may have, provide additional information, and review a revised Plan that incorporates these comments.

Sincerely,

Tom Luster

Tom Luster
Staff Environmental Scientist
Energy and Ocean Resources Division

cc: Poseidon Resources – Peter MacLaggan
State Lands Commission – Judy Brown