



January 28, 2019

David Gibson, Executive Officer  
San Diego Regional Water Quality Control Board  
2375 Northside Dr.  
San Diego, CA 92108

CC: Brandi Outwin- Beals, Senior Water Resources Control Engineer  
Ben Neill, Water Resource Control Engineer

Re: Poseidon Water LLC's Carlsbad Desalination Plant stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922

Dear David Gibson,

On behalf of the Surfrider Foundation and Orange County Coastkeeper (Organizations), we submit the following comments regarding Poseidon Water LLC's (Poseidon) Carlsbad Desalination Plant (Carlsbad plant) stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922. The Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's ocean, waves and beaches. Surfrider maintains over 20 local chapters throughout California and is fueled by a powerful network of activists. Orange County Coastkeeper believes all people have the inalienable right to clean water. We promote and restore water resources that are Drinkable, Fishable, Swimmable and Sustainable.

The Organizations have significant concerns regarding the Tentative Order (TO), its compliance with the State Water Resources Control Board (State Water Board) 2015 Ocean Plan with Desalination Amendment (OPA) and the ability of the applicant to meet the proposed requirements set in the TO. As such, we urge you to consider the following comments.

#### Discharge and Flow Augmentation

##### **Flow Augmentation Impacts**

Flow augmentation is one of the least effective technologies that currently exists to minimize impacts to marine life from seawater desalination brine discharge. As such, all future ocean desalination facilities – besides Carlsbad – are prohibited from using flow augmentation. According to the tentative order (TO), "Flow augmentation provides a dilution of 1-part undiluted effluent (60 MGD) to 2.97 parts flow augmentation dilution water (178 MGD), resulting in a total of 3.97 parts water." Hence, as a result of using flow augmentation, the Carlsbad plant intakes approximately three times the amount of sea water when compared to discharge alternatives such as comingling brine with wastewater streams or multiport diffusers.

According to the TO and the OPA, 100% marine life mortality should be assumed with all surface level intake technology, meaning triple the intake would result in triple the impact to marine life. Further, the OPA assumes wedgewire screens will reduce entrainment mortality by a mere 1%. Some recent studies indicate that multiport diffusers, for example, result in a higher mortality ratio at discharge sites when compared to flow augmentation. However, more recent analyses suggest that the impacts are significantly less in total than that which would result from the inordinately higher amount of water intake (and associated 100% marine life mortality) required with flow augmentation. See Attachment A.

#### **Carlsbad Plant Flow Augmentation Exemption**

Under the OPA, flow augmentation as an alternative brine discharge technology is generally prohibited. However, the Carlsbad plant, which was far along in the permitting process before passage of the OPA, received a special condition for their original temporary permit co-located with the Encina Power Plant stating, “the facility must: use low turbulence intakes (e.g., screw centrifugal pumps or axial flow pumps) and conveyance pipes; convey and mix dilution water in a manner that limits thermal stress, osmotic stress, turbulent shear stress, and other factors that could cause intake and mortality of all forms of marine life; comply with chapter III.M.2.d.(1); and not discharge through multiport diffusers.” However, with the decommissioning of the Encina Power Plant, the Carlsbad plant must now operate under a *new* NPDES permit as a stand-alone operation. This new permit must be in full compliance with the OPA and the above mentioned exemption is now void.

#### **Flow Augmentation Prohibited**

As stated, flow augmentation as an alternative brine discharge technology is generally prohibited in the OPA. In order for Poseidon to use flow augmentation and simultaneously comply with the OPA, the application must, “demonstrate to the regional water board that the technology provides a comparable level of intake and mortality of all forms of marine life as wastewater dilution if wastewater is available, or multiport diffusers if wastewater is unavailable.” Poseidon has yet to effectively demonstrate that the proposed flow augmentation will comply with this exception. Given the unlikelihood of Poseidon’s proposed flow augmentation to meet this standard based on the impacts described above, the plant will be operating out of compliance with the OPA in the interim period from adoption of the Final Order and when stand-alone operation construction and the Brine Discharge Empirical Study is completed. Also an additional period of noncompliance is anticipated in the TO through the suggestion that a Time Schedule Order may have to be issued as a mechanism to bring the plant into compliance if the Empirical Study shows noncompliance with OPA.

Poseidon did provide an analysis to compare flow augmentation impacts with that of a multiport diffuser to the Regional Water Board using the preferred Roberts methodology and submitted it in late 2018. However, the analysis is inadequate and has not yet been accepted by Regional Water Board staff for consideration in the tentative order. It appears that the study Poseidon submitted found that diffusers would entrain 170MGD. See TO at H 1-33. Based on that finding, combining the approximate entrainment from an approximate 100MGD intake and 170MGD diffuser, the comparison clearly shows

intake and mortality would be minimized by 10% compared to a 300MGD intake flow. And as Attachment A points out, rough estimates suggest an even more disparate impact is likely.

Arguably there is enough evidence for the Final Order to require Poseidon to build a 100MGD intake that minimizes intake and mortality, and a properly sited and designed diffuser. But at a minimum, the Organizations request this analysis be reviewed and verified before issuance of a Final Order and NPDES permit. The Roberts methodology represents the best available science for estimating the impact of multiport diffusers. **The Organizations strongly urge the San Diego Regional Water Quality Control Board (Regional Water Board) to require an acceptable analysis using the *Brine Diffusers and Shear Mortality* report by Philip J.W. Roberts, April 18, 2018, referenced as the Roberts Report in Finding 31 of Attachment H.1 of the tentative order, prior to issuance of the Final Order.**

#### **Brine Discharge Empirical Study and Final Report**

Despite the OPA special conditions, the TO for Poseidon's Carlsbad plant allows for the continued use of flow augmentation in order to dilute concentrated brine prior to discharge. In an attempt to comply with the OPA, the TO's Special Provisions 2a, requires Poseidon to submit a Brine Discharge Technology Empirical Study and Final Report (Empirical Study). This report will be conducted over 12 consecutive months following initial operation of the new intake structure and finalized within 6 months. However, the time table provided in the TO, allows Poseidon up to 5 years to complete construction of the intake infrastructure. Five years is the maximum amount of time allowable under the OPA; however, the Regional Water Board is not obligated to allow the maximum.

Indeed, 5 years is unreasonably long given that the entire plant was constructed in two years and the shutdown of the Encina Power Plant was a clearly foreseeable event before construction was completed. In the TO as drafted, the Carlsbad plant will potentially be able to continue with interim operations for up to five years. After construction is complete, the trigger for the 18 month Empirical Study and Final Report will begin. Thus, the new intake structures may be constructed and operating for 6.5 years before compliance with the OPA is verified. This is unacceptable and unreasonable. Even worse, the TO suggests a Time Schedule Order may be needed after noncompliance with the OPA is confirmed by the Empirical Study, potentially adding five or more years of noncompliance.

Further, the OPA requires, "“Within 18 months of *beginning operation*, submit to the regional water board an empirical study that evaluates intake and mortality of all forms of marine life associated with the alternative brine discharge technology.” (emphasis added). The OPA requires the empirical study to begin with 18 months of beginning operation. The Carlsbad plant operations and use of flow augmentation are ongoing and technically begin at the date of issuance of the Final Order and NPDES permit issuance. Arguably, the empirical study should be completed within 18 months and certainly not 6.5 years post issuance. **Nonetheless, the Organizations strongly recommend that the Regional Water Board require construction of the new intake infrastructure to be completed within two years with finalization of the Brine Discharge Empirical Study. Further, given the likelihood the Brine Discharge Empirical Study will show that minimizing intake volume combined with a properly sited and designed**

**diffuser would be a superior alternative (ie, not favorably “comparable”), the Final Order should include enforcement provisions – as discussed below.**

### **Compliance with OPA**

Finally, and most importantly, the Regional Water Board must provide stronger assurance that the Carlsbad plant will not be allowed to operate for prolonged periods of non-compliance with the OPA in the Final Order. This is especially prudent given the high likelihood that flow augmentation will not be found to have a comparable level of intake and mortality as wastewater dilution or multiport diffusers. The TO includes the following language in an attempt to ensure compliance:

“If the Final Report shows that the flow augmentation choice for brine discharge technology results in more intake and mortality of marine life than if the Facility used wastewater dilution or multiport diffusers, then the Discharger must also submit with the Final Report a proposed schedule to either:

- (a) Cease using the alternative brine discharge technology and install and use wastewater dilution or multiport diffusers to discharge brine waste; *or*
- (b) Re-design the alternative brine discharge technology system to minimize intake and mortality of all forms of marine life to a level that is comparable with wastewater dilution if wastewater is available or multiport diffusers if wastewater is unavailable, subject to San Diego Water Board approval.”

Further, similar to the enforcement provisions in Attachment D section 1.B. of the TO [“Need to Halt or Reduce Activity Not a Defense”], the provisions for the Brine Discharge Empirical Study should make perfectly clear that if the Study Report shows augmented intake flow results in greater intake and mortality than minimized flow and diffusers, the plant must cease operations and modify the intake and construct the diffuser, and that an additional noncompliance period through a Time Schedule Order is not an option.

The Organizations support statements made in sections (a) and (b) and urge the Regional Water Board to further clarify and strengthen these requirements. The Final Orders should state:

“If the Brine Discharge Empirical Study and Report shows that mortality with ~100 MGD intake and use of multiport diffusers is less than the mortality from the augmented flow intake at ~299MGD, Poseidon must cease operations and change the technology. Poseidon assumes all financial responsibility for proceeding with the proposed flow augmentation design option and may not rely on a financial infeasibility claim (for a design change) upon non-compliance with the OPA. Poseidon will be expected to change technology and/or discontinue operations immediately. This order is final.”

This clarification will ensure that the Carlsbad plant will not be given an unjustified exception to the OPA and that Poseidon is expected to comply with state laws and regulations. **The Organizations strongly recommend the Regional Water Board include additional language to clarify and strengthen the requirement for compliance with the OPA.**

According to the tentative order, construction costs for the Carlsbad plant's stand-alone operations will be up to \$84 million. This is a considerable amount of financial resources. Poseidon must assume all financial liability for the extremely risky decision to proceed. Indeed, the court ruling in Surfrider Foundation v. California Regional Water Quality Control Board, San Diego Region and Poseidon Resources (Channelside) Llc, et.al. (Super. Ct. No. 37-2010-90436-CUWM-OTL), found that the Carlsbad plant did not violate section 13142.5(b) of California Water Code while co-located with the Encina Power Plant. However, the findings state that, "Poseidon will be required to reapply to the Regional Board for authorization to operate in a stand-alone mode, and the Regional Board, in that instance, will review whether additional measures are necessary for compliance with section 13142.5(b)" – indicating that Poseidon remains subject to liability and additional compliance verification with state laws and regulations in their stand-alone permit.

#### Chronic Toxicity

The Carlsbad plant began delivering water to San Diego County in December 2015 and is the nation's largest seawater desalination plant. Unfortunately, the Carlsbad plant has continuously violated the Regional Water Board's discharge permit and has done so since operations began in 2015. In April 2016, the Regional Water Board issued a notice of violation finding that the Carlsbad plant had failed to comply with several provisions of its discharge permit, including failures to comply with discharge prohibitions, receiving water limitations, and effluent limitations, and failure to monitor in accordance with discharge provisions. Later, in December 2016, the Regional Water Board issued a staff enforcement letter describing 19 occasions on which Poseidon had exceeded daily maximum toxicity limits. In its annual discharge permit monitoring report for 2016, Poseidon stated that it had exceeded chronic toxicity limits in 30% of tests. In 2017, the Regional Water Board cited for exceeding chronic toxicity violations in 36 out of 90 total toxicity tests as well as 11 deficient monitoring and 2 reporting violations. In 2018, Poseidon has been cited for 11 chronic toxicity violations, 1 deficient monitoring violation and 1 Category one pollutant violation for exceeding total suspended solids effluent limitations.

Since opening, Poseidon has been unable or unwilling to resolve this toxicity issue. The testing limits established for chronic toxicity at location M-001 (pre-dilution) are listed as enforceable in the existing NPDES permit. In the new stand-alone operations permit and tentative order, chronic toxicity is listed as enforceable only at location M-002, after the brine is diluted and no longer at M-001. The tentative order cites Poseidon's explanation of the toxicity without any further justification for changing the testing requirements. The tentative order states that:

*"Additionally, between December 2015 through January 2018, the Discharger reported 61 exceedances of the chronic toxicity maximum daily effluent limitation of 16.5 TUc at monitoring location M-001 of the undiluted brine. In response to the effluent limitation exceedances for chronic toxicity, **the Discharger reported that the violations are an artifact of the chronic toxicity effluent limitation in Order No. R9-2006-0065 not accounting for the flow augmentation dilution water provided by the Encina Power Station.** Monitoring samples that*

account for the flow-augmentation dilution water provided by the Encina Power Station did meet the chronic toxicity effluent limitation prior to discharging to the Pacific Ocean, and also passed the TST statistical approach for determining compliance with chronic toxicity monitoring included in this Order. ***Nevertheless, the Discharger conducted an extensive Toxicity Identification Evaluation (TIE), and the results were inconclusive as to the source and cause of toxicity*** (emphasis added).

Poseidon's explanation for the violations is that the brine is undiluted. However, this is precisely the point of the enforceable testing location M-001 in the existing NPDES permit. The pre-dilution limitation was set according to acceptable chronic toxicity limitations in concentrated brine. Testing location M-001 is crucial to understanding the Carlsbad plant's discharge and must remain enforceable for chronic toxicity. There is an acceptable limit of chronic toxicity – no matter how much the brine is diluted. This is because the discharge is released into the nearshore environment in which marine life, ocean users, beach goers and recreational users rely. According to toxicologists, there is a potential for accumulation of elements of the chronic toxicity in the nearshore environment, despite dilution. Poseidon's statement that the violations at M-001 are an artifact of the chronic toxicity effluent limitation in Order No. R9-2006-0065 not accounting for the flow augmentation dilution water provided by the Encina Power Station are not relevant to the continuing need to identify the source of toxicity of the brine and need to be removed from the TO.

As mentioned in the tentative order, Poseidon completed a series of toxicity evaluations to determine the cause of the chronic toxicity and released the final evaluation report (TRE) in April 2018. The report rules out several potential direct causes such as salinity and harmful algal blooms. The report also finds that certain chemical and polymer additives could contribute to the toxicity findings at higher concentrations. And though the evaluation did not test the actual concentration of polymer additives in the final effluent, the report states that the effluent is "suspected" to have low enough additive concentration levels that polymers would not have a significant effect. The report speculates that a confluence of polymer and chemical additives may be at fault, however. **In light of the Carlsbad plant's past and ongoing discharge permit violations and the inconclusive results of the Poseidon's toxicity evaluations, the Organizations strongly urge the final order to include chronic toxicity as an enforceable limitation at testing location M-001.**

#### Sediment Assessment for Physical and Chemical Properties

The tentative order requires Poseidon to conduct a Sediment Assessment for Physical and Chemical Properties (Sediment Assessment) as part of the Benthic Monitoring Work Plan described in Attachment E. According to the tentative order, "Sediments can accumulate these particles over the years until the point where sediment quality is degraded and beneficial uses are impaired. Benthic organisms are strongly affected by sediment contaminant exposure because these organisms often live in continual direct contact with sediment/pore water, and many species ingest significant quantities of sediment as a source of nutrition." **Given the potential for serious impacts as stated, along with ongoing chronic toxicity violations at the Carlsbad plant, the Organizations strongly support the Sediment Assessment.**

The chronic toxicity violations highlight the urgent need for sediment sampling, especially given the inconclusive nature of the cause of the violations. As previously stated, according to local toxicologists, there is a potential for accumulation of elements of the chronic toxicity in the nearshore environment, despite dilution. And given the results of the TRE were inconclusive, sampling to understand the potential impact is especially prudent. The sampling for the Sediment Assessment is required on a biannual basis in the tentative order. **The Organizations strongly urge the final order to require sediment sampling to be conducted twice per year, rather than every other year.** This will provide a much more representative sample given the dynamic nature of sediment in the marine environment and seasonal fluctuations.

We commend the Regional Water Board for their efforts to reduce and mitigate the tremendous environmental impacts of the Carlsbad plant and hope to see further incorporation of protective measures to achieve compliance with the OPA in order to protect marine life and water quality. Thank you for your consideration of these comments.

Sincerely,



Mandy Sackett  
California Policy Coordinator  
Surfrider Foundation



Raymond Hiemstra  
Associate Director  
Orange County Coastkeeper

ATTACHMENT A: ESTIMATED MORTALITY COMPARISON

*The Organizations offer the text below as a simple illustration of the likelihood that the proposed flow augmentation will result in more entrainment mortality than minimizing the intake and discharging the waste through multiport diffusers.*

The Tentative Order (at Section VI.C.2) would require Poseidon to conduct a study to compare the entrainment effects resulting from flow augmentation versus those that would result from a multiport diffuser. Based on currently available information, it appears likely that the facility would cause substantially less total entrainment if it did away with flow augmentation and instead used some form of diffuser technology.

We offer these rough calculations and considerations to illustrate the high likelihood that minimizing intake flow in combination with brine discharge through multiport diffusers will reduce entrainment mortality compared to the proposed “augmented intake flow.”

- Poseidon currently uses about 100 MGD of its intake volume to produce water and about 200 MGD of its intake volume as flow augmentation to dilute its discharge. Existing evidence shows essentially 100% mortality from the total intake volume of 304 MGD. The Ocean Plan finds that wedgewire screens like those proposed in the Tentative Order would reduce entrainment by a modest 1%.
- Without flow augmentation, Poseidon’s intake flows would presumably be reduced by about two-thirds – from 304 million gallons per day (“MGD”) to about 100 MGD – which would result in a proportional reduction of entrainment. The facility’s discharge volume would also be reduced to roughly 50 MGD.
- Analyses done for Poseidon’s proposed Huntington Beach facility show that a diffuser is expected to result in about 50-60% more entrainment than that caused by the intake ([https://www.waterboards.ca.gov/santaana/water\\_issues/programs/Wastewater/Poseidon/2018/DUDEK.pdf](https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon/2018/DUDEK.pdf) – see page 13, which identifies a 168 MGD diffuser-entrained flow resulting from that facility’s 106 MGD intake flow and its approximately 50 MGD discharge flow). The total volume causing entrainment would therefore be 104 MGD +168 MGD = 272 MGD.
- Those volumes would be similar to Poseidon’s Carlsbad facility operating without flow augmentation, so it would presumably result in less total entrainment – instead of causing entrainment in 304 MGD, it would cause it in ~272 MGD.
- Notably, the Huntington Beach example involves the intake and discharge affecting the same nearshore water (and same plankton community). However, Carlsbad’s intake takes water from a more productive estuary with higher population densities and discharges it into less productive nearshore waters. The Carlsbad-Poseidon Marine Life Mitigation Plan, and Ocean Plan Amendment, found that estuaries are significantly more biologically productive and the mitigation ratio of 10:1 was reasonable for creation of estuarine habitat to replace the entrainment mortality of ocean species. Therefore, even though Carlsbad would have about the discharge entrainment volume of 168 MGD with diffusers in the nearshore compared to nearly 200MGD in the estuary, it would be entraining substantially fewer organisms and result in far less (~1/10<sup>th</sup>) overall mortality than when it operates using flow augmentation in the estuary.

While the Board's approach allows for a study that presumably will better characterize the expected entrainment from the screened intake, it will also result in Poseidon initially installing a much larger screened intake system than may be needed if the study results show that a diffuser have more positive results (less entrainment) compared to flow augmentation. Further, the augmented intake through screened intakes would have already been in operation for approximately 6.5 years (on top of the current non-compliant operation), causing cumulative impacts. Finally, it is our understanding the Marine Life Mitigation Plan has yet to be completed, so the entrainment impacts are not currently mitigated. Also, after the current Temporary Permit was issued, the ETM/APF compensatory calculation was modified and adopted into the OPA -- consequently the Poseidon-Carlsbad MLMP may need revisions to fully comply with the new ETM/APF formula.