



June 7, 2017

Mr. Scott Maloni
Vice President, Poseidon Water
5780 Fleet Street, Suite 140
Carlsbad, CA 92008

Subject: Ocean Plan Desalination Amendment Shearing Mortality Guidelines Represents the Best Available Science

Dear Scott:

I have prepared the following memorandum after reviewing the California State Lands Commission's (SLC) Draft Supplemental Environmental Impact Report (DSEIR) and comments submitted regarding the California-American Water Company (Cal-Am) Monterey Peninsula Water Supply Project (MPWSP) Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS). The subject of this memo is identifying the best scientific approach for assessing shearing-related entrainment effects associated with the proposed Huntington Beach Desalination Plant's (HBDP) brine diffuser.

The HBDP's DSEIR is being prepared by the SLC and was released for public comment on May 26, 2017. Per an April 26, 2017 email from SLC to Mr. Maloni of Poseidon Water, after consultation with the Santa Ana Regional Water Board's staff, SLC requested an analysis of potential shearing mortality based on the approach proposed by Dr. Phil Roberts ("Roberts' Model") and incorporated into the MPWSP DEIR/EIS.

The May 9, 2017 TWB Environmental Research and Consulting (TWB) memorandum previously provided to the SLC includes a comprehensive analysis of the Roberts' Model and definitively concludes that the Roberts Model should not be used for the Huntington Beach Desalination Project because the Roberts Model:

- Is plagued by computational errors that render it scientifically unsound and unworkable for replication in Huntington Beach;
- Includes Monterey Bay site-specific assumptions and data that is not applicable to Huntington Beach;
- Does not represent the empirical data necessary to deviate from the shearing-related regulatory requirements of the 2015 California Ocean Plan Desalination Amendment (OPA), and uses an approach which was known to the State Water Board at the time of the OPA, which was rejected by non-use (which is particularly relevant given Dr. Roberts' involvement in the State Board's Expert Review Panel in Impacts and Effects of Brine Discharges during the development of the SED);



- Has not undergone any peer review necessary to deviate from the shearing-related regulatory requirements of the OPA.

Given the questions surrounding the Roberts' Model, the SLC staff and its CEQA consultant Aspen decided to base the Huntington Beach Desalination Project's shearing-related entrainment analysis on the regulatory guidance found in the OPA. Specifically, the DSEIR states on page 4-59: "*In the absence of information justifying use of assumption number other than 23 percent for the proposed diffuser, the CSLC is using this guidance from the SWRCB when presenting estimates for diffuser entrainment.*"

The focus of this memo is the recommended best scientific approach for assessing the diffuser's potential shearing-related impacts and corresponding mitigation acreage resulting from an operating brine diffuser.

State Water Board Substitute Environmental Document (SED) Guidance on Turbulence Mortality Estimation

In brief, the OPA and its associated administrative record primarily contained in the Substitute Environmental Document (SED) gave clear "how-to" guidance for calculating diffuser shear impacts on plankton, with an example calculation. A mass balance equation incorporating the brine discharge volume and salinity is solved to derive the dilution volume needed to reduce the salinity to ambient + 2 ppt, or 35.5 ppt for southern California. The SED guidance is to assume 23% of that required dilution volume is subject to lethal shearing forces. This results in a final volume of water that can be considered to contain plankton suffering 100% mortality. No further guidance on evaluating shearing impacts are provided in the SED. On 2017, Poseidon provided the Regional Board with a copy of a technical memorandum entitled "*Brine Discharge Mortality Calculations for the Huntington Beach and Carlsbad Desalination Projects*" (Application Appendix KKK), which included a description of why we feel Empirical Transport Model and Area of Production Foregone (ETM/APF) was the proper modeling approach to get to an acreage. Poseidon and its scientific team have treated this as any volume of seawater subject to lethal operations, such as a surface intake. The ETM/APF were used to convert the marine life mortality in the final water volume to an area currency that can be factored into mitigation option evaluations. The ETM/APF were chosen as these represent the preferred method for similar analyses of intake impacts to marine life.

Further, page 86 of the SED states that "*shearing-related mortality would only occur within the area that exceeds 2.0 ppt above natural background salinity, and mitigating an area equivalent to that area exceeds 2.0 ppt above natural background salinity would also compensate for shearing-related mortality.*" Therefore, per the OPA SED, mitigating for the area encompassed within the BMZ would fully compensate for both toxic salinity and shearing-induced mortality resulting from the brine discharge. This finding suggests application of the ETM/APF approach as proposed by Poseidon would provide conservatively larger compensatory mitigation than

only mitigating for the area that “exceeds 2.0 ppt above natural background salinity,” which, in the case of the HBDF, is 0.46 acres.

Role of Regional Water Quality Control Board in Determining the Appropriate Turbulence Mortality Estimation Approach

With regards to the OPA administrative record as it pertains to shearing impacts of the brine diffuser, pages 115-116 of the State Water Board’s staff report directly discuss the implementation of the 23% of entrained dilution volume in shearing impact assessment. Per the SED, it is at the applicant’s discretion to use the SED guidance for calculating the shearing impact to plankton (i.e., regulatory assumption of 23% mortality) or to derive an alternative approach:

"Discharging through multiport diffusers would require an assessment of mortality that occurs as a result of the increased salinity at the discharge and any shearing-related mortality associated with the diffusers even though the effects will likely be minimal from properly sited multiport diffusers (Foster et al. 2013; Bothwell comment letter 2014). An owner or operator could use existing shearing data (see discussion in section 8.5.1.2 above) that has been approved by the regional water board or alternately, could elect to do their own diffuser entrainment modeling under the guidance and approval of the regional water board. Empirical studies of diffuser-related mortality are technically feasible and encouraged, but may be cost prohibitive. As more studies are done, there will be more information available on how to better estimate diffuser-related mortality in order to establish a performance standard for alternative brine disposal technologies."

The administrative record makes clear that there are three options for an owner/operator to choose from in assessing shearing-related mortality:

1. The owner/operator could use the shearing data in 8.5.1.2 that has been approved by the Regional Board (i.e., 23% assumption); or
2. The owner/operator could elect to do its own modeling study under the guidance and approval of the Regional Board; or
3. The owner/ operator could conduct an empirical study.

Of these options, #3 is infeasible because the diffuser does not exist in Huntington Beach. Option #2 leaves to the discretion of Poseidon to do its own modeling study. Poseidon has chosen to rely on option #1 as it serves as the OPA’s regulatory standard.

Review of MPWSP DEIR/EIS Public Comments

A review of the public comments on the MPWSP DEIR/EIS supports the conclusion that:

1. The Roberts' Model incorporated into the CalAM MPWSP is scientifically unsound. Deviating on a project-by-project basis from the OPA regulatory standard creates confusion and uncertainty, and
2. While there is no obligation for California Environmental Quality Act (CEQA) responsible agencies to adopt the OPA's regulatory guidance, project-specific CEQA analysis should be consistent with the OPA requirements to ensure that the analysis is relevant to a Regional Board's assessment of compliance with the OPA.

These comments include:

1. California Water Boards March 28, 2017– Cosigned by Claire Waggoner (State Water Board) and John Robertson (Central Coast Water Board)
 - a. Water Board staff (Staff) acknowledged the OPA and CEQA are independent, but noted that Staff will rely on analyses and information conducted as part of CEQA.
 - b. Staff requested that the DEIR/EIS “*assess any potential discharge-related mortality of all forms of marine life, including incremental shearing- or salinity-related mortality for both the commingled and brine-only discharge scenarios.*”
2. City of Marina by Farella, Braun, and Martel, LLP March 29, 2017
 - a. On Pg. 44, the contents of Appendix D1 Roberts' Model, the veracity of their methods, and applicable conclusions were discussed and disputed.
 - i. Pg. 45 “*Inadequate data precludes sufficient analysis of impacts, and renders the whole analysis of the Project's brine discharge impacts on marine resources inadequate.*”
 - ii. Pg. 48 “*Although the Draft EIR/EIS admits the Project will have adverse impacts to squid (which the Draft EIR/EIS wrongly describes as less than significant), the Draft EIR/EIS fails to sufficiently consider and analyze impacts to other species in the same area. Instead of conducting a thorough analysis, the Draft EIR/EIS writes off such impacts by referring to “unanticipated effects” on “benthic and pelagic communities in the vicinity of the discharge” (page 4.5-61). This is an inadequate analysis of one of the Project's most significant effects: the brine discharge. The inadequacy of this analysis is likely a result of the*

Draft EIR/EIS's incomplete and insufficient description of the environmental baseline (see above), particularly in the area where the brine will be discharged. Without inclusion of information necessary to understand the Project's potential impacts, the EIR is defective."

3. John Hurt March 28, 2017
 - a. Expressed concern over the modeling in Appendix D1 Roberts' Model, especially the decision not to include ocean current effects in modeling the brine mixing zone.
4. Monterey Regional Water Pollution Control Agency March 28, 2017
 - a. *"The EIR/EIS approach states that the discharge to the ocean (brine, trucked brine, and secondary effluent) may not meet Ocean Plan requirements. ... MRWPCA urges the CPUC to improve the analysis of this issue in the EIR/EIS to ensure that the project can feasibly comply with the Ocean Plan and be permitted, and to enable use of the EIR/EIS by MRWPCA and the RWQCB as responsible agencies for their subsequent project approvals."*
 - b. Pg. 7. *"The modeling in the EIR/EIS Appendix D1 includes the Ocean Outfall having an opening underneath the End Gate at the termination of the outfall. As the Ocean Outfall exists now, it will allow 5% of all the brine discharge water (per Appendix D1 Page 52) onto the seafloor with minimal dilution during negative buoyant conditions. The End Gate must be closed for MRWPCA to accept brine. All dilution calculations should be revised accordingly."*
 - c. Pg. 7-8. *"MRWPCA objects to this section and the appropriate appendices (D1, D2, and D3) that support this section [Section 4.3.5.3]. MRWPCA believes that due to its signed Water Purchase Agreement that the PWM project must be assumed to be operating under all proposed project and alternative scenarios. Data in this section was not calculated with that assumption. ... And as stated above, they do not reflect closing the opening under the End Gate. MRWPCA cannot rely on the EIR/EIS for approval of use of its outfall facilities unless the analysis includes operation of PWM and reflects closing the opening under the end gate."*

The above comments and notes indicate that the Roberts' Model assumptions and analysis raise questions among the commenting public and stakeholders. As of this letter's writing, no responses to comments have been posted by the California Public Utilities Commission, the CEQA lead agency. Therefore, the MPWSP DEIR/EIS and supporting appendices should be considered draft documents only and are subject to revision and additional analysis. Applying any methods or conclusions from the Roberts' Model would be premature, at best. Thus far, the

available peer review has publicly noted flaws in the analysis. These flaws have not been addressed, rendering the model unsound at this time.

As noted by some commenters and prior Poseidon submittals, portions of the MPWSP DEIR/EIS analysis do not follow the OPA's assumptions and therefore not applicable to the later permitting process conducted by the State and Regional Water Quality Control Boards under the guidance of the OPA. This is especially true for the brine discharge shearing impact assessment. Regardless of the validity of the Roberts' Model, the model is not contained or referenced in the OPA regulatory standard and process detailed in the OPA administrative record and final staff report (SED). This process stipulates that 23% of the volume of receiving water needed to dilute the brine discharge to an ambient + 2.0 ppt should be considered to contain lethal shearing forces. The project proponent may propose an alternative method for the Regional Board staff to review and approve or disapprove prior to its use. No other options are available per the statutory language in the absence of collecting new empirical data from an operating diffuser and amending the OPA through a public regulatory process.

Huntington Beach Interagency Permit Sequence Agreement

In September 2016, Poseidon Water and the staffs of the SLC, Santa Ana Regional Water Quality Control Board (Regional Board) and Coastal Commission (CCC) reached an agreement on the orderly and timely completion of the permitting process for the proposed HBDP. The agreement tasks the SLC with certifying the CEQA analysis of the proposed modifications to the seawater intake and discharge facilities to include 1-mm wedgewire screens with a through-screen velocity of 0.5 ft. per second or less and a brine diffuser. These technological enhancements are being proposed by Poseidon to demonstrate compliance with the OPA's technology requirements for minimizing the intake and mortality of all forms of marine life. The interagency agreement requires the Regional Board staff to provide guidance to the SLC so that the environmental analysis in the DSEIR is sufficient for the Regional Board to make a determination that the proposed Project complies with the OPA. Both the State and Regional Board staff have provided guidance to the SLC throughout the development of the DSEIR.

The SLC staff's review of the proposed Project's technology enhancements falls under CEQA, not the OPA, providing no obligation for the SLC to adopt the OPA's regulatory standards into the DSEIR's environmental analysis without consideration of other approaches. In its development of the DSEIR, the SLC considered other approaches to assessing shearing-related impacts, including the Roberts' method as suggested by the State Water Board staff. The SLC staff and its marine biology expert Dr. Peter Raimondi concluded that the appropriate standard for evaluating shearing-related impacts was the OPA's 23% regulatory standard (see DSEIR Section 4-59).

Conclusion

I conclude that the shearing mortality assessment guidance contained in the OPA and its supporting documents in the administrative record represents the best available and vetted science. Consistent with the requirements of the OPA, I recommend its continued use until such time empirical field data is available to refine the approach.

The review of the best available science and all available public documents related to regulating seawater desalination development and operation in California to minimize environmental impact indicates:

1. Per the SED, it is at the applicant's discretion to use the SED guidance for calculating the shearing impact to plankton (i.e., regulatory assumption of 23% mortality) or to derive an alternative approach.
2. The SED method of calculating volume equal to 23% of the volume needed to dilute the discharged brine to ambient salinity + 2.0 ppt is the most protective and scientifically-defensible impact estimate available through vetted methods.
 - a. Treating this like an intake-entrained volume using the ETM/APF results in a common regulatory currency – acres impacted.
 - b. No vetted or published and accepted alternative methods to calculate this impact thus far exists.
 - i. The Roberts' Model developed for the MPWSP DEIR/EIS has not undergone a formal review process and should not form the basis for the Huntington Beach Project's shearing mortality assessments.

Sincerely,
HDR

Miller, Eric
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Eric Miller

Environmental Project Manager

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Miller, Eric Frances
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