November 13, 2017

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

Subject: Review of Revised Draft Technical Memorandum – Review and Analysis of Expected Entrainment Effects at and near Poseidon's Proposed Huntington Beach Desalination Project by Tom Luster and Laurie Koteen, Ph.D., Coastal Commission

Dear Mr. Maloni:

I reviewed the above referenced document dated October 13, 2017. It is a revision of the earlier August 3, 2017 document authored by California Coastal Commission staff (Staff) reviewing prior entrainment analyses and assessments I prepared for the Huntington Beach Desalination Plant. I have the following comments on the revisions noted in the October 13 letter.

- Addition of California Halibut to Table 5 area of production forgone calculations
    - This omission was not noted in my prior review of the August 3 document. While including all species with sufficient information is important, this inclusion did not materially change my interpretation of the result. The area of production forgone estimates were substantially higher than even those generated for the Huntington Beach Generating Station Retool Project, the original source for the data and area of production forgone. This is a significant factor considering the generating station seawater intake volume was more than twice as high as the desalination plant estimated seawater intake volume. All entrainment estimates are founded on the volume of water impacted and should scale accordingly as that volume changes assuming all other parameters are the same. In the case of Station E, only the seawater intake volume differed between the generating station and desalination project analyses. Therefore, all entrainment impact analyses, area of production forgone included, should scale approximately the same as the water volume. To be clear, it is not an exact 1:1 scaling, but if water volume declines the entrainment impact declines as well.
- Change in 34-day *Emerita* source water calculation
    - This was not commented on in my prior review. Rather, I contended in my earlier comments, and now, that a 34-day exposure for the *Emerita* Stage 1 Zoea larvae caught during plankton sampling is incorrect and based on a questionable laboratory estimate. The 34-day stage duration estimate came from a study that noted only a few larvae survived to transition from Stage 1 to Stage 2, with all individuals dying upon transitioning. As noted in my earlier comments, this suggests the larvae were stressed and suffering an extended stage duration as a result of rearing conditions in the laboratory.

- Change in determining the 95% confidence interval
    - This was not commented on in my prior comments as the final area of production estimates were determined to be clearly anomalous so the method used to calculate the 95% confidence interval was not investigated. The calculation of the 95% confidence interval stated in the October letter and original August Document is inconsistent with recommended procedures. Staff did not present evidence that the area of production forgone estimates were normally distributed, rather assumed a normal distribution based on the Central Limit Theorem. Specific concerns over the distribution was discussed in Raimondi (2011) on pg. 11 where he states:
    There are substantial concerns about the use of parametric approaches (MacKinnon et al. 2004) when the underlying shape of the distribution in question is unknown or known and non-normal. APF values are synthetic not directly measured terms, and even the theoretical shape of the distribution of such values is unknown, hence both parametric and resampling methods were used and compared.
    For each (treatment) combination of Power Plant, sample year, larval duration (mean or maximum period of vulnerability) and habitat (open coast or estuarine), APF (equation 6) and the standard error of APF (SE_{APF}) was calculated. These were used to generate confidence values based on a normal inverse function (Z inverse).
    Furthermore, it is unclear if Staff used the standard deviation or standard error in their equation. Dr. Raimondi's April 25, 2008 presentation to Staff determined standard error was preferable to standard deviation in the calculation of confidence intervals:
    I concluded that the sample standard deviation was inappropriate for use using this function and instead used the sample standard error as an estimate of the standard deviation of the population means.
    Use of standard deviation in lieu of standard error results in a higher APF estimate assuming all other parameters remain the same.

The revised APF estimates by staff were reduced in comparison to their original August 3, 2017 memo estimates. These revised estimates for the 106 million gallons per day desalination project remain substantially higher than even the 253.3 million gallons per day power plant using the same intake structure. Staff estimated the APF at Station E, the location of the existing intake structure, was 218.03 to 225.90 acres depending on the *Emerita* age used. The California Energy Commission consultants, including Dr. Raimondi, concluded the power plant APF equaled 104[1] acres (Davis et al. 2006), or less than one-half of the estimates derived by Staff despite the power plant drawing more than twice as much water as the desalination project. Both estimates,

[1] The total mitigation was ultimately reduced to 66.8 acres in the California Energy Commission's Final Order for Docket 00-AFC-13C.

power plant and Staff's desalination, originate from the data collected in 2003-2004. The power plant estimates were derived using the original raw data produced during the field study. Staff appears to have continued their use of summarized data contained in MBC and Tenera (2007). The precise reason for the anomalous values presented by Staff remain unclear, but their continued use of summarized data despite the availability of the 2003-2004 raw data likely factors into the discrepancies.

Sincerely,
HDR

Eric Miller
Environmental Project Manager

References

Davis, N., P. Raimondi, R. York, and J. Reinhardt. 2006. Huntington Beach Units 3&4 entrainment and impingement study results, mitigation options, staff and working group recommendations, and AES's response and objections to the recommendation. California Energy Commission. Available at: http://www.energy.ca.gov/sitingcases/huntingtonbeach/compliance/2006-09-14_ANALYSIS.PDF

MBC Applied Environmental Sciences and Tenera Environmental (MBC and Tenera). 2007. AES Huntington Beach Generating Station Clean Water Act Section 316(b) impingement mortality and entrainment characterization study final report. Prepared for AES Huntington Beach L.L.C.

Raimondi, P. 2011. Variation in Entrainment Impact Based on Different Measures of Acceptable Uncertainty. Prepared for California Energy Commission, Public Interest Energy Research Program. http://www.energy.ca.gov/2011publications/CEC-500-2011-020/CEC-500-2011-020.pdf