May 6, 2019

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Sent via electronic mail to: hope.smythe@waterboards.ca.gov

RE: Evidence to Demonstrate ISTAP Flaws in the Poseidon – Huntington Beach Subsurface

Dear Ms. Smythe:

We are writing in regard to the March 22nd, 2019, Santa Ana Regional Water Quality Control Board (Regional Board) informational presentation on the proposed Huntington-Poseidon desalination facility and the feasibility of using slant wells for intake of seawater.

A majority of the staff presentation focused on the concern that slant wells would "drawdown" freshwater from the inland basin, rendering slant wells technically infeasible for the proposed facility. In fact, the presentation indicated that the staff analysis has already concluded that slant wells are not technically feasible. We strongly disagree with that conclusion, and what appears to be flawed analyses to support the conclusion.

The presentation raised several issues that require correction:

(1) Freshwater drawdown was explicitly removed as technical feasibility criteria in the state's Ocean Plan Amendment. If freshwater drawdown is to be considered at all, it must be properly characterized as an economic consideration. Orange County Water District's (OCWD) new limit of "zero" drawdown beyond what is currently occurring is not a valid threshold for determining technical or economic feasibility.
(2) Staff's stated confidence in computer modeling, absent data-backed calibration and validation is not credible. Further, to identify a more precise estimate of what volume of water can be withdrawn within a range of economic and technical feasibility requires more study.
(3) Given there is no proven "need" for a desalination facility in the Municipal Water District of Orange County's (MWDOC) Urban Water Management Plan (UWMP), or even OCWD planning documents, the Ocean Plan Amendment (OPA) requires the facility to utilize subsurface intakes and design the production capacity based on the volume that can be feasibly withdrawn from subsurface intakes.

Furthermore, we were deeply troubled by the State Water Board hydrogeologist's discussion of whether subsurface intakes were even a feasible technology – given the lack of large-scale subsurface intake operations internationally. This issue, raised by the State Water Board's hydrogeologist, has been asked and answered over a five-year period during the adoption of the Desalination Ocean Plan Amendment – the State Water Board has made a clear and definitive statement: subsurface intakes are the preferred technology for ocean desalination in California. To re-question the feasibility of subsurface intakes for large scale operations undermines years of policy work at the State Water Board. The use of subsurface

intakes not only minimizes the intake and mortality of marine life, but significantly reduces the need for in-plant pre-treatment, including the use of chemicals that are then discharged from the facility.

A new, independent study should be conducted to ascertain the technical feasibility of slant wells for the proposed facility that includes both the proposed site and design capacity, as well as other site locations and design production capacities that may increase the feasibility of subsurface intakes for the project. We strongly recommend a third-party review of the Geosyntec and HydroFocus analyses prior to issuance of a Tentative Decision. We further recommend the Regional Board employ the team of experts analyzing and testing slant wells for the proposed Doheny seawater desalination proposal ─ experts who already have experience in performing similar analyses at a nearby site. This technical feasibility study should then be followed by an economic analysis that evaluates the full cost and economic opportunity of subsurface intake.

I. COMPUTER MODELING MUST BE CALIBRATED WITH TEST WELLS BEFORE RELIANCE ON RESULTS.

The OPA is clear that subsurface intakes are the preferred technology for minimizing the intake and mortality of marine life, as mandated in the Water Code section 13142.5(b). While exceptions to the mandate are allowed, the project proponent must supply adequate proof that subsurface intakes are not feasible.

As we have demonstrated in the past through submission of the review of Poseidon's hydro-geologic computer modeling by HydroFocus, using computer modeling as a "screening tool" is not adequate proof that slant wells are infeasible. HydroFocus's review concluded that there was not enough data to accurately conclude that the freshwater drawdown predicted in the Geosyntec modeling would occur from offshore slant wells in the Talbert Aquifer. HydroFocus identified model limitations and uncertainty that affect the ability of the model to accurately predict impacts of project pumping. The Geosyntec model was not calibrated or verified using measured groundwater levels and pumping data . The review concluded that there is "very limited information on the water transmitting and storage properties of the aquifers and aquitards in the Talbert Gap on which to base model inputs."[1] HydroFocus concluded that "[p]umping at lower rates than originally simulated will reduce impacts on the groundwater system."[2] The model was most sensitive to changes in the aquifer properties of the Talbert Aquifer and the overlying sediments.[3] HydroFocus concluded that "[v]arying these properties produced large changes in model-estimated groundwater-level drawdowns and inland flow to the slant wells" and as a result HydroFocus concluded that the large changes in model estimates demands "that more data is needed for these inputs to improve model certainty."[4] To ensure accuracy of the assumed values used in computer modeling, actual data must be gathered and used to calibrate the model runs and ensure the validity of the model output.

The HydroFocus review recommended installing test wells to ground-truth Poseidon's modeling. The Regional Board instead requested core samples of the seafloor from Poseidon. As explained below, core samples would only offer some data to extrapolate vertical conductivity, and therefore would not offer a complete set of data to calibrate the model. Nonetheless, Poseidon simply refused to take the core samples and, for reasons unknown, Regional Board staff apparently withdrew the request.

Recharge of slant wells occurs through multiple directions. Slant wells reach seaward under strata that may limit vertical conductivity – that is, seawater recharging the well from above. However, the aquifer

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[1] HydroFocus Inc., Huntington Beach Seawater Desalination Facility Groundwater Model Evaluation, pg. 2 (September 23, 2016); *available at* https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon/2018/HydroFocus_Expert_Report.pdf.
[2] *Id.*
[3] *Id.*
[4] *Id* at 1.

also terminates offshore in deeper water allowing horizontal recharge that may or may not be a more important variable in the model than vertical recharge, depending on actual horizontal conductivity during pumping the wells. Finally, the drawdown of freshwater will also be a function of horizontal conductivity, but also a function of the volume water injected into the seawater intrusion barrier. Currently, according to testimony by OCWD, the loss of freshwater to the ocean is approximately 1,000 acre-ft per year (ac-ft/yr) of freshwater transitioning to seawater without any wells installed offshore. The question is how much additional freshwater would be collected in slant wells given accurate analyses of vertical conductivity, horizontal conductivity and potential adjustments to the volume of freshwater injected into the seawater intrusion barrier without adverse impacts from seawater intrusion and loss of freshwater availability to local extraction wells.

The circumstances presented by the informational meeting demand an independent third-party assessment of whether computer modeling, without any calibration using actual data for validation of the output, adequately proves that slant wells would not be technically feasible for supplying source water for a desalination facility. Further, the circumstances demand that the assessment includes steps to validate what volume of freshwater would be withdrawn at different volumes of extraction to determine what size production facility could be built utilizing subsurface intakes for the entire intake volume. That is, as noted below, given the lack of any proof of "need" identified in the relevant UWMP for the region, what volume of source water could be feasibly extracted from slant wells for a desalination facility of a yet undetermined production capacity? We strongly recommend requesting this third-party analysis from the firm that analyzed the feasibility of slant wells for the nearby "Doheny Desal" proposal.

II. DRAWDOWN IS NOT A TECHNICAL FEASIBILITY CONSIDERATION.

Freshwater drawdown is not a technical feasibility consideration under the OPA. The State Water Board made a deliberate decision to remove "impact on freshwater aquifers" as a feasibility criterion under the OPA. On May 1st, 2015 the State Water Board released a Change Sheet that deleted "impact on freshwater aquifers" from the OPA's list of feasibility criteria.[5] And on May 6th, 2015 the State Water Board adopted the final OPA without the feasibility criteria of "impact on freshwater aquifers."

As we have noted in prior comments, any potential drawdown of freshwater from the inland portion of the aquifer should not be characterized as a consideration of "technical feasibility." OCWD, Poseidon's proposed partner in the desalination proposal, has made the same observation in the past.[6] As OCWD has previously stated, the drawdown of freshwater may create an economic impact by mixing freshwater that was injected into the seawater intrusion barrier with the seawater being withdrawn for the proposed desalination facility. That economic impact would come from paying a price for 56,000 ac-ft/yr, yet OCWD would only net the volume of water produced minus what is lost from drawdown into the slant well.

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[5] *See* State Water Resources Control Board, Change Sheet 1: Draft Amendment to the Water Quality Control Plan for Ocean Waters of California Addressing Desalination Facility Intakes, Brine Discharges, and Incorporating Other Nonsubstantive Changes (May 1, 2015); *available at* https://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/docs/desalamend_050115cs1.pdf.

[6] See letter from OCWD to Regional Board dated May 18, 2018 at: https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon.html
"*These hydrogeologic conditions were accounted for in Geosyntec's Talbert Gap model, which estimated a maximum achievable slant well extraction rate of 70 mgd. Of that amount, the model estimated approximately 15 mgd would come from inland groundwater. 15 mgd of flow equates to a withdrawal of 16,800 acre-feet per year (AFY) from the groundwater basin and would be subject to payment of OCWD's replenishment assessment, currently $445 per AF.* Page 2 of 3.

According to testimony by OCWD's chief hydro-geologist at the informational hearing, the seawater intrusion barrier injection system currently loses approximately 1,000 ac-ft/yr to the ocean. OCWD's hydro-geologist also stated that he was not certain of the injection water volume flowing to the ocean, and it could be upwards of 2,000 ac-ft/yr. Furthermore, Geosyntec's model shows as much as 2,600 ac-ft/yr of injection water currently flows to the ocean. OCWD has informed the Regional Board that if a slant well is required, 1,000 ac-ft/yr loss of freshwater would be acceptable. Furthermore, the modeling recently presented by Poseidon to analyze wetland impacts relied on OCWD's stated limit of allowing only 1,000 ac-ft/yr of injection water flowing to the ocean, to be captured and pumped by the slant well intakes. Finally, based on the staff presentation, it seems that Regional Board staff has concluded that capturing any more than 1,000 ac-ft/yr of OCWD's injection water, which currently flows to the ocean, would render the use of slant wells infeasible.

If the seawater desalination facility produced 56,000 ac-ft/yr, but the slant well withdrew 1,000 ac-ft/yr of freshwater, the "net" increase in freshwater available to OCWD would be 55,000 ac-ft/yr. That would be an approximate impact of less than 2 percent to the "gross" addition of potable water to the OCWD portfolio. And the economic impact to OCWD member agencies would be reflected in an increase in the Replenishment Assessment which would be far less than the 2 percent increase for the desalination water alone.

To the best of our knowledge the Regional Board has not drafted an economic analysis of the impact of drawdown, nor whether the potential drawdown would be considered economically infeasible in comparison to the decades of marine life mortality from approving a surface intake.

Finally, the staff presentation clearly indicated that there has already been a conclusion that slant wells are not feasible. And in response to a Board member question, staff indicated a "confidence" that test wells would not significantly change the output of the unvalidated computer modeling. There was no indication of the scientific foundation for that "confidence." And we believe it was improper to imply there is a scientifically sound basis for concluding slant wells are not feasible without first calibrating the model with actual test data. Further, the emphasis in the staff presentation on potential drawdown of freshwater as the foundation for concluding slant wells are not technically feasible is misplaced – drawdown of freshwater is an economic consideration.

Drawdown of freshwater into slant wells is not a technical feasibility issue. Simply put, if slant wells can produce the volume of water to supply the desalination facility operation, they are technically feasible. If, on the other hand, the slant wells would withdraw a significant volume of freshwater, there would be clear economic issues to review. And again, simply put, the question is whether that economic impact outweighs the mandate to minimize the intake and mortality of marine life.

Setting a limit of "zero" impact is not a reasonable economic impact threshold and must be rejected by the Board. However, the staff presentation to the Board made no mention of an economic analysis – leaving an implication that none is needed. That is misleading at best. And if staff has no intention of preparing an economic evaluation, as implied in the staff presentation, then it is a clear misunderstanding and violation of the OPA.

The circumstances presented by the informational meeting demand an immediate clarification that the computer modeling, and the predicted volume of freshwater drawdown, has not been validated by calibrating the computer model with actual data. Further, it must be clarified that core samples are inadequate for calibration of the complex variables involved in recharging the aquifer with seawater and/or inland freshwater. Finally, staff must immediately clarify that any potential drawdown of freshwater raises issues that must be analyzed in an economic feasibility analysis – drawdown is not a technical feasibility consideration.

III. WITHOUT AN URBAN WATER MANAGEMENT PLAN IDENTIFYING "NEED", SUBSURFACE INTAKES CANNOT BE FOUND INFEASIBLE FOR THE PROJECT PROPONENT'S PREDETERMINED DESIGN CAPACITY.

The staff presentation appeared to imply that the simple inclusion of a 50 million gallon a day production ocean desalination facility in an Urban Water Management Plan (UWMP) list of possible new sources, in and of itself, demonstrates "need" in the region. We strongly disagree. While the proposed Poseidon desalination facility is mentioned in the most recent UWMP published by the Municipal Water District of Orange County (MWDOC), it is not characterized as a necessity. In fact, MWDOC has continued to refine the supply reliability analysis used in the UWMP and has recently published an updated comparison of "alternatives" to meet the projected future reliability goals in the region. Among the "alternatives", the proposed Poseidon facility was found to be the least valued from both a reliability and cost perspective.

Identifying a proposed seawater desalination facility as an "also ran" alternative that is less reliable and less cost-effective to meet the regional supply reliability goals does not serve as proof of "need" for the facility – it is just the opposite.

The circumstances presented by the informational meeting demand an immediate clarification that the OPA mandates the use of subsurface intakes unless the project proponent provides an UWMP that adequately illustrates the "need" for product water that could not be provided by subsurface intakes. Accepting an UWMP that simply mentions a desalination plant as one of several alternatives to meet future demand is not adequate proof of "need" – especially when the UWMP identifies the desalination alternative as the least reliable and cost-effective option. To allow a mere mention of the project proposal in an UWMP, without any clear evidence that the volume of water produced is needed for future supply reliability, would render the regulation meaningless.

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A new, independent study should be conducted immediately to ascertain the technical feasibility of slant wells that includes both the proposed site and design capacity, as well as other site locations and design capacities that may increase the feasibility of subsurface intakes for the project. We strongly recommend a third-party review of the Geosyntec and HydroFocus analyses prior to issuance of a Tentative Decision. We further recommend the Regional Board employ the team of experts analyzing and testing slant wells for the proposed Doheny seawater desalination proposal ─ experts who already have experience in similar analyses at a nearby site. This technical feasibility study should then be followed by an economic analysis that evaluates the full cost and economic opportunity of subsurface intake.

Sincerely,

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