Appendix CCCCC to the Huntington Beach Project’s application for amendment and renewal of Order No. R8-2012-0007, NPDES No. CA8000403 and CWC Section 13142.5(b) compliance determination

**Appendix CCCCC - Executive Summary**

Relying on reports in the Santa Ana Regional Water Quality Control Board’s (“Regional Board”) administrative record, Appendix CCCCC includes over forty (40) pages of point-by-point responses to each of the three reports provided by the California Coastkeeper Alliance (“Coastkeeper”).

The following is a summary of responses to Coastkeeper’s June 21, 2018 and July 2018 submittals.

Information from the Regional Board’s **Administrative Record** shown in BOLD

**California Water Code section 13142.5(b) is not a “technology-forcing” statute:**

Far from being a “technology-forcing” statute as Coastkeeper claims, section 13142.5(b) simply requires that the Regional Board take a holistic approach to analyzing a proposed desalination facility and potential alternatives. Courts have defined a “technology-forcing” statute as requiring the regulated entity to use the best feasible technology or inducing the entity to develop superior technology not necessarily in existence at the time the regulation was promulgated. Here, section 13142.5(b) is not “technology-forcing” in that way. There is no requirement in the Water Code or elsewhere that requires the use of subsurface intakes in every instance. Nor does the statute require the development of new technology, as the statute explicitly provides for the use of the “best available . . . technology.”

This conclusion is supported by the Ocean Plan Amendment (“OPA”) which acknowledges the limitations of subsurface intake technologies and recognizes that subsurface intakes will not be feasible in all locations.

The OPA was developed through a multi-year process that included scientific and technical experts to determine the best methods to minimize and mitigate the impacts of seawater intakes and effects of brine discharges. The OPA underwent an external scientific peer review to evaluate the validity of its scientific conclusions.

The State Water Board’s Substitute Environmental Document (“SED”) identified a number of alternatives including mandating subsurface intakes for new projects. The State Water Board expressly rejected this “technology forcing” approach, finding that: “The viability of subsurface intakes is highly dependent on site-specific conditions and hydrogeology. Consequently, requiring subsurface intakes as the only intake technology may result in overly-restrictive conditions that effectively eliminate desalination as an option for some communities. In addition, Porter-Cologne
specifically allows mitigation to factor into site selection. A facility that can show that their siting, design, technology, and mitigation measures minimize marine life mortality should be able to proceed with alternative intake methods. Consequently, Option 2 (mandating subsurface intakes) does not meet the project goals because it restricts the potential locations of desalination facilities and could limit the feasibility of desalination as an alternative water supply option.” (SED, p. 69.)

Furthermore, the State Water Resources Control Board (“State Board”) specifically acknowledged the limitations of slant wells. The State Board Resolution adopting the OPA (Resolution 2015-0033) finds that: “The State Water Board has identified potentially significant impacts to hydrology and water quality resulting from reasonably foreseeable methods of compliance with the proposed Desalination Amendment. These impacts include the potential for operation of subsurface wells to cause or exacerbate saltwater intrusion into freshwater aquifers or alter groundwater flow to freshwater aquifers and wells. Pursuant to express terms of the Desalination Amendment, the feasibility determination for subsurface intakes will entail analysis of issues that include hydrogeology. As a result, a proposed facility that with (sic) apparent potential to result in such impacts is unlikely to be approved. However, due to the site-specific nature of this determination, the potential for such impacts is uncertain and is appropriately addressed more extensively in a project-specific CEQA analysis.” (Resolution 2015-0033, ¶ 29.)

**Poseidon is not relying solely on ISTAP to support a determination of subsurface seawater intake feasibility:**

Poseidon is not relying solely on the Coastal Commission’s Independent Scientific and Technical Advisory Panel (“ISTAP”) Phase 1 and Phase 2 reports to support a determination that subsurface intakes are infeasible. Instead, Poseidon is relying on the entirety of the Project’s fifteen-year permitting history and the extensive evaluation of subsurface intake feasibility that pre- and post-dates the adoption of the OPA, including but not limited to the Project’s 2005 Final Recirculated Environmental Impact Report (“FREIR”), 2010 Final Subsequent Environmental Impact Report (“2010 FSEIR”), 2012 Regional Board NPDES Permit and 2017 State Lands Commission’s 2017 Final Supplemental Environmental Impact Report (“2017 FSEIR”).

The study and analysis of alternative subsurface intakes has been a primary focus throughout the Project’s fifteen year permitting process and a particular point of focus during the decade-long Coastal Development Permit (“CDP”) application process.

Specifically, in 2005, ten years before the adoption of the OPA, the City of Huntington Beach’s FREIR evaluated the technical and environmental feasibility of alternative subsurface intakes and concluded: “A vertical/Ranney well system … would result in
significant construction-related and long-term operational impacts due to large-scale disruption of the beach and/or coastal areas. Other alternative intake methods, such as an infiltration gallery or seabed infiltration system, would also be infeasible due to significant land use and/or marine biological impacts” … “None of the proposed alternative intake systems would be an acceptable substitute.” (See Appendix J).

In 2010, the City of Huntington Beach’s 2010 FSEIR evaluating the long-term stand-alone operation of the desalination facility concluded: “Any one of the site-specific conditions would render subsurface intakes more impactful to the environment than the project because it would result in either irreversible damage to the Talbert Marsh, Brookhurst Marsh, and the Magnolia Marsh and negate years of restoration measures, result in a number of negative environmental impacts and human health risks, including the following: (1) detrimental environmental impact of intake well operations on the adjacent Talbert Marsh, Brookhurst Marsh, and the Magnolia Marsh due to dewatering; (2) poor water quality of the Talbert Aquifer in terms of ammonia, bacterial contamination and lack of oxygen; (3) interception of contaminated groundwater from nearby Ascon Landfill, which may introduce carcinogenic Hydrocarbons in the Source water supply of the desalination facility; (4) possible interception of injection water from Talbert Barrier by the intake which may impair the function of this barrier to protect against seawater intrusion; (5) subsidence of public roads and structures due to drawdown of the groundwater table; and (6) impairment if the aesthetic value of the coastal shore by the obtrusive aboveground intake structures.” (See Appendix D)

In approving the Project’s NPDES permit in 2012 (Order No. R8-2012-0007, NPDES No. CA8000403), the Regional Board found that for the temporarily stand-alone operation of the desalination facility that “alternative subsurface intake systems were determined not to be the environmentally preferred alternatives. Taking into account economic, environmental and technological factors, the Regional Water Board finds that the alternative subsurface intakes are not feasible.” (See Appendix C)

Furthermore, the Regional Board’s 2012 Order included a finding that the facility’s temporary stand-alone operating scenario complies with California Water Code Section 13142.5(b). While the project description has been amended since 2012 to comply with the 2015 OPA, there has been no evolution in subsurface seawater intake technologies or changes to the geological, hydrogeological or ocean environment offshore of Huntington Beach that would justify a change in the Regional Board’s determination that subsurface intakes are infeasible.

*The ISTAP conclusions served to validate a decade-long investigation of subsurface intake feasibility:*
The Coastal Commission’s ISTAP process was not the beginning or the end of the Project’s extensive subsurface intake feasibility investigation. The ISTAP and accompanying Well Investigation Team (“WIT”) serve as independent validation of the conclusions previously reached by local and state permitting and regulatory agencies over the course of a decade (See Appendix F and G).

On August 25, 2015, after the release of the final draft ISTAP Phase 2 report, Huntington Beach City Attorney Michael Gates’ office wrote to Concur Inc., the ISTAP and Well Investigation Team (“WIT”) facilitator, stating: “In September 2010, the City of Huntington Beach certified the Huntington Beach Desalination Project’s Final Subsequent Environmental Impact Report (State Clearinghouse No. 200151092) (the "FSEIR"), which evaluated the potential environmental impacts associated with the construction and the long term, stand-alone operation of Poseidon’s proposed Huntington Beach desalination facility. The FSEIR included in the alternatives analysis an open ocean intake option. More specifically, the FSEIR’s alternatives analysis included an evaluation of various subsurface seawater intake technologies, including a Subsurface Infiltration Gallery ("SIG" or “Long Beach-Fukuoka Type Intake”) (as referenced in the draft Report) and concluded that SIG was infeasible. Although the SIG-related assumptions and findings in Chapter IV (Environmental and Social Considerations) of the draft Report appear consistent with the City’s FSEIR, there is no reference to the FSEIR infeasible findings in the Report. In order for the Report’s account to be complete, it should include a reference that the City’s certified FSEIR analyzed a SIG alternative and concluded that it was infeasible. Likewise, the draft Report states that an environmental impact report would need to be prepared and certified before a SIG could be implemented. The certified FSEIR concluded that a SIG was both infeasible and an environmentally inferior option to open ocean intake design. It does not appear from the draft Report’s findings that circumstances have changed. In order for the Report’s account to be complete, it should include a reference to the FSEIR’s conclusion that a SIG is both infeasible and environmentally inferior to an open ocean intake design.” (See Appendix G1)

Coastkeeper’s contention that slant wells have not been proven to be infeasible ignores the Coastal Commission’s Well Investigation Team (“WIT”) conclusions and subsequent independent reviews:

The Coastkeeper-commissioned HydroFocus report appears to rely on dated information and was not informed by the extensive analysis conducted by the Coastal Commission’s WIT after the ISTAP Phase 1 process was completed. As such, HydroFocus did not use the updated base case groundwater model for its sensitivity analysis and does not appear to understand the history of the Project’s subsurface well investigation (See Appendix III).
The ISTAP Phase 1 report found that seawater wells (i.e., vertical wells completed in the shallow aquifer above the Talbert aquifer; vertical deep wells completed within the Talbert aquifer; vertical wells both above and below the Talbert aquifers; slant wells completed in the Talbert Aquifer; and radial collector wells tapping the shallow aquifer) are technically infeasible for the proposed Project due in part to: (a) performance risk; (b) local hydrologic conditions that would result in adverse environmental impacts including to fresh water aquifers and local wetlands; (c) sensitivity to sea level rise; (d) poor geochemistry and (e) lack of precedent in similar geological conditions (See Appendix F).

However, this was not the end of the investigation of slant well feasibility. At the close of ISTAP Phase 1, Commission staff requested additional investigation of different scales of intake well designs, which led to the independent WIT evaluation of slant wells and revisions to Geosyntec’s groundwater model. The groundwater model updates conducted as part of the WIT process were then subject to third-party review by a Coastal Commission staff-selected hydrogeologist, Dr. Detwiler (See Appendix L). Further, Orange County Water District staff hydrogeologists Roy Herndon participated in multiple reviews of the revised groundwater model updates requested by Coastal Commission staff and WIT (See Appendix L2 and L3). Finally, various model revisions and slant well analyses were conducted at the request of the Regional Board’s geologist to evaluate the feasibility of slant wells at the proposed intake location, as well as at other sites along the Orange County coast and as part of a hybrid slant well-screened, ocean intake facility (See Appendices K, HHH, III, MMM and QQQQ).

The ISTAP did not determine that subsurface intakes were economically infeasible solely based on “willingness to pay”:

The ISTAP Phase 2 report confirms that the subsurface intake economic infeasibility determination meets the OPA’s requirements and was based on a wide range of considerations including: life cycle cost analysis; cost of product water (“willingness to pay”); whether Project revenues would cover costs; ability to secure Project financing; Poseidon’s willingness to proceed given the SIG’s economic disparities; and whether the SIG could be successfully accomplished in a reasonable period of time, consistent with the California Environmental Quality Act’s (“CEQA”) and the OPA’s definition of “feasible” (See Appendices QQ and AAAAA).
**Poseidon’s permit application complies with OPA section III.M.2.b(2):**

The proposed Huntington Beach desalination facility clearly meets the OPA’s requirements that the Regional Board: “Consider whether the identified need for desalinated water is consistent with an applicable adopted urban water management plan prepared in accordance with Water Code section 10631, or if no urban water management plan is available, other water planning documents such as a county general plan or integrated regional water management plan”. (Section III.M.2.b. (2).) (See Appendices N, O, P, P2, EE, FF, GG, LL1, LL2, MM and WW)

Coastkeeper claims that the Project application does not provide “a defined and documented need for 50 MGD in water supply that cannot otherwise be met by alternative means.” This statement is incorrect and misrepresents the intent of the OPA. (See Appendix NN).

Coastkeeper’s transparent advocacy for the prioritization of alternative supplies was rejected by the State Board’s OPA Final Staff Report Including the Final Substitute Environmental Documentation Adopted May 6, 2015 (“OPA Staff Report”), which states: “A goal of the proposed Desalination Amendment is to support the use of ocean water as a reliable supplement to traditional water supplies while protecting beneficial uses. Desalination is another water supply option that can be used in conjunction with other water supplies to ensure areas can meet their water demands. The proposed Desalination Amendment would establish an analytical framework for evaluating proposed desalination projects that would use seawater in order to increase availability of potable water supplies. It is up to water providers to evaluate various supply options and costs and impacts of each to make informed decisions about future supplies. Selecting water supply alternatives at a local, regional, or statewide level is not the State Water Board’s role and the State Water Board does not propose to prioritize or rank water supply options on a statewide level.” (OPA Staff Report, p. H-7.)

**Coastkeeper provided no new information or evidence of subsurface intake feasibility:**

Coastkeeper’s June 21st and July 9th submittals provide no new information or evidence to support their supposition that subsurface seawater intake technologies are feasible for the proposed Project. Coastkeeper’s reports have been thoroughly addressed by information that can be found in the Regional Board’s administration record. The detailed responses in Appendix CCCCC cite specific reports and information in the Regional Board’s administrative record demonstrating that Coastkeeper’s contentions are incorrect, lack legal substantiation and are based on Coastkeeper’s unfamiliarity with the Project’s permitting history and the files in the Regional Board’s administrative record.
**Coastkeeper’s reports are not third-party or independent:**

The technical reports paid for by Coastkeeper and cited as justification for subsurface intake feasibility cannot be considered independent or “third party” as repeatedly alleged. Truly, the only independent third-party review of the feasibility of subsurface intakes in Huntington Beach was conducted by the Coastal Commission’s ISTAP and WIT. This two-year process, which included State and Regional Board staff participation and the participation of Coastkeeper and other desalination stakeholders, was the most comprehensive and independent evaluation of the feasibility of subsurface intakes ever conducted in the state’s history and confirmed that subsurface intakes are not feasible for the proposed Project.
Poseidon’s Response to James Fryer’s Summary of Findings & Conclusions in the document “Review of Water Demand Forecasts for the Orange County Water District”

Information from the Regional Board’s Administrative Record shown in BOLD

Fryer: The Orange County Water District uses outdated water demand forecasts for the year 2035 that are 91,846 acre-feet per year, or 17.5%, higher than the more recent water demand forecasts for its service area retailers. In its Long-Term Facilities Plan 2014 Update and Groundwater Management Plan 2015 Update, the Orange County Water District (OCWD) uses water demand forecasts derived from its retailers’ 2010 Urban Water Management Plans (UWMPs). In the more recent 2016 demand forecasts in the Orange County Reliability Study, used for the updated 2015 UWMPs for the retailers, collectively the water demand forecasts are reduced 17.5% compared earlier forecasts used in the Long-Term Facilities Plan 2014 Update.

Poseidon Response: The Orange County Water District’s updated future demand projections within its service territory are 447,000-acre feet per year in 2035 (see July 12, 2018 OCWD letter to the Regional Board), which is consistent with the demand projections in the Municipal Water District of Orange County’s (“MWDOC”) 2015 Urban Water Management Plan (“UWMP”) Update (see Appendix FF - MWDOC 2015 UWMP Update).

The Fryer report’s contentions regarding future demand projections are both inaccurate and irrelevant to the Regional Board’s determination of compliance with the OPA. Desalinated water will replace on a one-for-one basis the need to import water into Orange County (See Appendix WW – MWDOC letter to the Regional Board dated July 7, 2016 and the Metropolitan Water District of Southern California October 2, 2017 letter to the State Lands Commission). As such, desalinated water is not serving planned future growth in water demand, and thus various projections – high or low – are irrelevant. Under the most current water forecast projections, absent the Project, the OCWD’s service territory alone will need to import over 100,000-acre feet of water per year (twice the Project’s capacity) (See Sept. 8, 2017 OCWD letter to the State Lands Commission), and on a countywide basis the projected demand for imported water is substantially higher.

OPA chapter III.M.2.b.(2) states that when siting a proposed desalination facility, the Regional Board should “[c]onsider whether the identified need for desalinated water is consistent with an applicable adopted urban water management plan prepared in accordance with Water Code section 10631, or if no urban water management plan is available, other water planning documents such as a county general plan or integrated regional water management plan.” The Regional Board can make the
findings in OPA chapter III.M.2.b.(2) because the Project is identified in applicable water planning documents, as described above (see Appendix MM – August 3, 2016 OCWD letter to the Regional Board) and Appendix WW – MWDOC letter to the Regional Board dated July 7, 2016).

Finally, the State Water Board expressly rejected the notion that there should be a water resource preference, or “loading order”, when determining a proposed desalination project’s compliance with the OPA. The OPA staff report states, “A goal of the proposed Desalination Amendment is to support the use of ocean water as a reliable supplement to traditional water supplies while protecting beneficial uses. Desalination is another water supply option that can be used in conjunction with other water supplies to ensure areas can meet their water demands. The proposed Desalination Amendment would establish an analytical framework for evaluating proposed desalination projects that would use seawater in order to increase availability of potable water supplies. It is up to water providers to evaluate various supply options and costs and impacts of each to make informed decisions about future supplies. Selecting water supply alternatives at a local, regional, or statewide level is not the State Water Board’s role and the State Water Board does not propose to prioritize or rank water supply options on a statewide level.” (see Appendix NN – August 31, 2016 Whitepaper “Determining the Need for the Huntington Beach Desalination Project on the Basis of ‘Desal as the Last Resort’ Approach is Contrary to the Desalination Amendment.”)

Fryer: The previous Urban Water Management Plans consistently overestimated future demand. Starting in the year 2000, for each cycle of the 5-year UWMPs, based on declining actual demand trends the retailers repeatedly reduced demand forecasts for subsequent years compared to previous forecasts.

Poseidon Response: See previous response. This contention is not germane to the Regional Board’s consideration of the Project or determination of OPA compliance. Planned future regional water supply projects, like the Project, are evaluated in long-term planning documents prepared by regional water supply agencies like OCWD and MWDOC (see Appendices LL1 and LL2 - May 2, 2016 and July 26, 2016 White Paper and addendum entitled “Clearly Identifying the Local Need for 50 Million Gallons per Day of Desalinated Ocean Water for the Huntington Beach Desalination Project’s Planned Design Capacity”).

Fryer: The Orange County Reliability Study used by the retailers for their new water demand forecasts, uses multiple instances of conservative assumptions that, as with past UWMPs, can be expected to overestimate future demand. The Reliability Study forecasts are the basis of the Municipal Water District of Orange County and OCWD retailers’ 2015 UWMP forecasts. Some fundamental assumptions in the water demand model are inconsistent with historic and recent water use patterns. The
assumptions that may lead to overestimates of future demand, and discussed in more detail in this report, include: Population forecasts, Demand during multiple year droughts, Demand rebound after drought, Drought vs. recession water use patterns, Infill development, Price elasticity of demand, Future conservation innovation.

Poseidon Response: See previous responses. This contention is not germane to the Regional Board’s consideration of the Project or determination of OPA compliance because the Project is identified in relevant water planning documents and therefore complies with OPA Chapter III.M.2.b.(2). (see Appendices LL1 and LL2 - May 2, 2016 and July 26, 2016 White Paper and addendum entitled “Clearly Identifying the Local Need for 50 Million Gallons per Day of Desalinated Ocean Water for the Huntington Beach Desalination Project’s Planned Design Capacity”).

Fryer: The Long-Term Facilities Plan 2014 Update does not account for an additional 65,000 acre-feet per year of high quality treated wastewater that is expected to become available within the next 5 to 10 years. The new source of treated wastewater would be equal or better than the quality of water that is currently used to replenish groundwater basins and would not be subject to shortages during drought. About 65,000 acre-feet per year is expected to become available for groundwater recharge into the Orange County Water District basin.

Poseidon Response: As stated above, the State Water Board expressly rejected the notion that there should be a water resource preference, or “loading order”, when determining a proposed desalination project’s compliance with the OPA. Furthermore, on October 18, 2017, OCWD sent a letter to the State Lands Commission in response to “incorrect statements” made by Coastkeeper’s regarding OCWD’s stated interest in the desalination project. OCWD’s letter included the following, “[Coastkeeper] indicates that if the proposed Metropolitan Water District (MWD) Carson Indirect Potable Reuse project is completed and provides OCWD with water, that the Poseidon project would not be needed. OCWD believes this statement is incorrect. At this time it is OCWD’s understanding that if recycled water from the MWD Carson project is received by the District it would replace the 65,000-acre feet per year of untreated MWD water that is currently annually purchased by OCWD. Additionally this comment by Orange County Coastkeeper does not account for the primary purpose of the proposed Poseidon project which is too (sic) reduce the areas need for imported water.”

Fryer: Water users have repeatedly demonstrated the willingness and ability to substantially curtail water use during serious, multi-year drought events. Many of the early year UWMPs acknowledged that water users would curtail use during serious drought years. But by the 2005 UWMPs, water use was generally assumed to increase 6% to 9% during single and multiple drought years. Since water shortages during drought drives the need for new supplies, underestimating the ability and
willingness of water users to curtail demand during 2 serious drought years can lead to unnecessary and expensive new supply projects and financial difficulty for water suppliers.

Poseidon Response: See Previous responses. This contention is not germane to the Regional Board’s consideration of the Project or determination of OPA compliance because the Project is identified in relevant water planning documents and therefore complies with OPA Chapter III.M.2.b.(2). The Project is not being proposed to operate only during drought conditions, but instead the facility is planned to be a base-loaded facility that will offset reliance on imported water from climate-dependent sources (see Sept. 8, 2017 OCWD letter to the State Lands Commission; October 2, 2017 Metropolitan Water District of Southern California letter to the State Lands Commission)

OCWD has confirmed the need for a new local drinking water supply in various correspondence with the Regional Board and has advised the Regional Board: “In evaluating the District’s planning documents, it is important for the Regional Board to understand that the District’s pursuit of new local water supplies, including the Huntington Beach Project, is based on policies adopted by the board over the past several years. These policies provide the foundation for the District’s interest in the Project. Specifically, in January 2013 the District’s Board of Directors adopted a policy to maintain a 75% Basin Pumping Percentage (“BPP”). This policy goal can only be achieved through the development of new supplies that are locally controlled by the District to ensure that the higher BPP is sustainable over time. In furtherance of this Policy, on May 15, 2013, the board of directors resolved that it is the policy of the District to consider and develop a variety of new, local water resources – including seawater desalination – to ensure sufficient water supplies are always available to the residents and businesses in the service territory. Finally, it is District policy to reduce the BPP if the cumulative groundwater basin overdraft reaches 350,000-acre feet. Today the District groundwater basin is 75% depleted and the cumulative overdraft stands at 375,000-acre feet … The Huntington Beach Project’s 56,000-acre feet per year capacity is the single largest source of new, local drinking water supply available to the region. In addition to offsetting imported demand, water from the Project could provide flexibility in how the District manages the groundwater basin, specifically the desalinated water could be used to augment supplies we inject into our Talbert Seawater Barrier to help prevent seawater intrusion into the groundwater basin. It is the District’s mission to provide the cities and retail water districts it serves with a reliable, adequate, high-quality water supply at the lowest reasonable cost in an environmentally responsible manner. The Huntington Beach Desalination Project provides the District and Orange County with a unique opportunity to add a large quality of locally controlled, drought-proof water to our
supply portfolio.” (See Appendix MM – OCWD August 3, 2016 letter to the Regional Board).

Fryer: The retailers’ 2015 Urban Water Management Plan demand forecasts, as with the earlier plans, do not account for ongoing conservation innovation. Ongoing conservation innovation, unforeseen at the time of past demand forecasts, is now a well-established pattern that has contributed to actual demand remaining well below forecasted levels. Ongoing innovations in conservation devices and practices can be expected to continue reducing urban per-capita water demand during the demand forecast period.

Poseidon Response: See previous responses. This contention is not germane to the Regional Board’s consideration of the Project or determination of OPA compliance because the Project is identified in relevant water planning documents and therefore complies with OPA Chapter III.M.2.b.(2). Orange County is meeting and exceeding state mandated conservation initiatives and is ahead of state 2020 conservation targets. Per capita water use is below state averages and is less today than in 1989 despite a 20% increase in population over that period of time. (See Appendix FF - MWDOC 2015 UWMP Update; Appendix WW – MWDOC letter to the Regional Board dated July 7, 2016; Appendix MM – August 3, 2016 OCWD letter to the Regional Board). However, these conservation measures do not obviate the need for a local, climate-resilient drinking water supply, as described in OCWD’s August 3, 2016 letter.

Fryer: The retailers’ 2015 Urban Water Management Plans indicate that most of the service areas are at or near build-out. Since there is relatively little undeveloped space in the OCWD service area, most future development will be in-fill development. This can be expected to lower average per-capita water use and will be an important dynamic that should be addressed in water demand projections.

Poseidon Response: See previous responses. This contention is not germane to the Regional Board’s consideration of the Project or determination of OPA compliance because the Project is identified in relevant water planning documents and therefore complies with OPA Chapter III.M.2.b.(2). (See Appendix FF - MWDOC 2015 UWMP Update; Appendix WW – MWDOC letter to the Regional Board dated July 7, 2016; Appendix MM – August 3, 2016 OCWD letter to the Regional Board).

Fryer: Water providers with service areas at or near buildout that substantially overestimate future demand risk inefficient use of limited financial resources on unnecessary capital projects, revenue stability problems, and ratepayer backlash. Historically, water demand forecasts used multiple conservative assumptions in an effort to reduce the risk of uncertainties, particularly for rapid growing service areas.
However, the situation is different for service areas not experiencing rapid growth, and at or near buildout. Overestimating future demand for service areas at or near build-out creates long-term risks that should be carefully considered.

Poseidon Response: See previous responses. This contention is not germane to the Regional Board’s consideration of the Huntington Beach project or determination of OPA compliance because the Project is identified in relevant water planning documents and therefore complies with OPA Chapter III.M.2.b.(2).
1. **HydroFocus**: We verified that the model geometry, boundary conditions, and aquifer properties generally agreed with information reported by Geosyntec Consultants with some exceptions. The cell dimensions were slightly different than reported and the ocean in model Layer 1 was not represented as constant head in all areas as was reported.

**Poseidon Response**: Geosyntec reported that grid cell horizontal dimensions vary from approximately 60 by 60 feet near the coastline in the central portion of the Talbert Gap, to as large as 500 by 500 feet near the margins of the model domain. HydroFocus reports that grid cell dimensions range from 52 to 869 ft. along the columns (X direction) and from 56 to 672 ft. along the columns (Y direction). As Geosyntec reported in 2015 and 2017 (See Appendix A3 - Geosyntec memorandum “Revision and Sensitivity Analyses of Slant Well SSI Model Feasibility Assessment of Shoreline Subsurface Collectors Huntington Beach Seawater Desalination Project” and Appendix QQQQ – Geosyntec memorandum “Groundwater Modeling to Evaluate Feasibility of Subsurface Seawater Intakes in Bolsa, Sunset, and Alamitos Gaps, Water Board Request RCF 23 Alternative Sites Evaluation for the Proposed Desalination Project at Huntington Beach”), the grid was refined near the coast to facilitate representation of the wetlands and alternative locations for the locations for the slant wells. Variable MODFLOW grid cell dimensions are perfectly acceptable. It is unclear whether HydroFocus’ report is referring to “inconsistencies” between the actual range of grid sizes and our reported approximately 60 feet and as large as 500 feet, or if they have a misconception that grid dimensions must be constant in MODFLOW. The variable grid-size certainly does not influence the model results.

As illustrated by the Figure below, where the ocean is present most of the Layer 1 cells have specified heads (brown color) that represent the hydraulic head slightly above mean sea level (0.57 ft). The inland portion of Layer 1 is inactive (teal color).
For areas offshore of the headlands east and west of the Talbert gap, because of topographic interpolation between the headlands and sea floor, the elevation of the base of Layer 1 in these areas is higher than 0.57 ft. Therefore, the hydraulic head for the Layer 1 could not be specified at 0.57 ft in these areas because base of the layer is above that elevation.

As the figure below illustrates, most of the Layer 1 grid cells in these areas are dry because the water table is below them.

In response to this comment a revised version of the V6 model (V6-2) was developed where the 0.57 ft head value in these areas was specified for the underlying layer for which the bottom elevation is below 0.57 ft msl (mostly Layer 2, and a few cells in Layer 3). This revision provides a slightly larger specified ocean area, which results in slightly more flow from the ocean to the slant wells, which pump from model layers 5 – 8 (Figure 14 Geosyntec, 2013a) (See Appendix K - Feasibility Assessment of Shoreline Subsurface Collectors, Huntington Beach Seawater Desalination Project, Huntington Beach, California, September 2013). However, this revision resulted in very little change in the model results: Contribution from inland sources decreased from 9.9% to 9.3% and contribution from the ocean increased from 87.2% to 88.0%.
Please note that the initial model simulations (Appendix K - Geosyntec, 2013a) of pumping from slant wells under the beach (e.g. model V6), which showed approximately 10 percent of the pumped water coming from inland aquifers, included an optimistically high hydraulic conductivity (Kh and Kv of 10 and 1 ft/d) for the shallow sediments between the ocean and the Talbert Aquifer. This version of the model was intended to provide a screening level, very optimistic estimate of ocean contribution to the slant wells.

Independent review (See Appendix L – December 18, 2015 memo “Review of groundwater flow modeling developed by Geosyntec to simulate pumping from slant wells beneath the beach in Huntington Beach” by Dr. Russell Detwiler) and the Well Investigation (WIT) panel that met with the Coastal Commission considered the hydraulic conductivity of the sediments above the Talbert Aquifer for V6 of the model to be too high. These sediments are dominantly fine-grained and function as a confining unit above the Talbert Aquifer (see Geosyntec, 2013b attached to this submittal). Per the WIT, the subsequent model revisions used Kh and Kv of the overlying strata that were reduced from 10 and 1 feet per day (ft/d) to 1 and 0.1 ft/d for the base case simulations.

Results of revised modeling requested by the WIT for sensitivity analyses with lower hydraulic conductivity for the shallow sediments between the ocean and the Talbert Aquifer showed 22 percent of the pumped water coming from inland aquifers for the updated base case and 36 percent for five times lower hydraulic conductivity (See Appendix A3). The hydraulic conductivity assigned to the shallow sediments in the model version that showed 22 percent of the pumping water coming from inland aquifers is considered more realistic than the optimistically high hydraulic conductivity assigned in the initial models (e.g. V6), which was intended to provide a screening level maximum production estimate for the slant wells.

HydroFocus did not use the updated base case model for their sensitivity runs.

2. **HydroFocus**: Pumping at lower rates than originally simulated will reduce impacts on the groundwater system. Operation of the slant wells will affect the extent of seawater intrusion in the Talbert Aquifer; pumping will likely increase the gradient from inland areas toward the project wells which will enhance the movement of inland freshwater toward the coast and move the seawater/freshwater interface closer to the coastline. This increase in seaward gradient along with capture of seawater by the slant wells will have the effect of reducing the inland migration of seawater.
Poseidon Response: SSIs would reduce the inland migration of seawater within the Talbert Aquifer because the SSI pumping would increase hydraulic gradient from inland toward the coastal margin. This is why a portion of the water pumped by the SSIs would come from the inland aquifers and the Talbert Barrier Injection wells. Reduction of the effectiveness of aquifer replenishment by the Talbert Barrier Injection wells is unacceptable to the OCWD. Moreover, extraction by subsurface intakes of groundwater from inland aquifers in Orange County would be subject to a replenishment assessment by the OCWD. (See Appendix L2 - September 28, 2015 OCWD letter to Concur, Inc, the ISTAP and WIT facilitator; February 12, 2016 OCWD issued a letter in response to Dr. Detwiler's review; and OCWD May 18, 2018 letter entitled “Review of Geosyntec Report prepared for Poseidon to Evaluate the Feasibility of Subsurface Seawater Intakes in Bolsa, Sunset, and Alamitos Gaps for the Proposed Huntington Beach Desalination Plant” and Appendix L3 – February 12, 2016 OCWD letter to the Coastal Commission entitled “OCWD staff comments on expert third-party review of WIT hydrologic model for the Poseidon Huntington Beach plant.”).

3. HydroFocus: We identified model limitations and uncertainty that affect the ability of the model to accurately predict impacts of project pumping. The model was not calibrated or verified using observed water level data. 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. Groundwater flow paths suggest that model results may be affected by the lateral boundaries of the model domain. The constant water levels specified for the seawater intrusion barrier assumes that the quantity of injection water will be available to maintain the water levels at the barrier regardless of the impact of the slant well pumping. Variable head cells representing parts of the ocean may result in an inaccurate estimation of the contribution of the ocean to the slant wells.

Poseidon Response: The SSI models were developed as screening tools to evaluate feasibility of SSIs for achieving the design intakes rates and evaluate likely impacts of pumping. As well documented, they are designed to be tools to evaluate an optimistic production capacity of SSIs and portion of flow from the ocean and inland. The models were not calibrated, but the model design and assigned properties are based on abundant geotechnical data including borings logs, geotechnical tests, hydraulic testing data (Geosyntec, 2013b) and existing models, including the OCWD model that is used as a tool for optimizing operation of the Talbert Injection Barrier (CDM, 2000). Reported values of hydraulic conductivity and descriptions of the generally fine-grained
sediments overlying Talbert Aquifer are summarized from eight documents, as summarized in a memorandum responding to requests by the Coastal Commission (See Response #2 Geosyntec, 2013b, which is provided as an attachment to this document).

The model lateral boundary conditions are physically based and reasonable. HydroFocus is correct that the constant head boundary condition at the Talbert Injection Barrier provides an unlimited supply of water in response to pumping. The constant heads specified at the injection barrier are based on measured water level data. The model increase in inflow at the injection barrier with SSI pumping provides an assessment of the impact to performance of the injection barrier by SSI pumping. The models indicate that injection rates at the barrier would need to be increased significantly to maintain the current amount of aquifer replenishment.

As discussed in our response to comment 1 above, the areas of “variable head” cells in Layer 1 for portions of the ocean offshore of the headlands that bound the Talbert Gap are a consequence of topography interpolation and model layer geometry. Revision to the model to include constant ocean head cells in underlying layers in these areas makes less than one percent of difference in the portioning of flow to the slant wells form the ocean and inland aquifer, most of which comes from the injection barrier.

4. HydroFocus: Several additional steps can be taken to improve the model and increase confidence in evaluating impacts of the project. We recommend:

(1) aquifer tests to determine properties of the Talbert Aquifer, the overlying sediments, and the wetland sediments;

Poseidon Response: As discussed above, the models are designed as screening tools and assigned properties are based on well-established models and existing hydraulic testing data as well as site-specific geotechnical and geophysical data (see Appendix A1 Eco-M Geophysics report dated September 1, 2013 and Eco-M Geophysics and Geotechnical report dated June 1, 2015).

Sensitivity analyses using a range of hydraulic properties were conducted to provide an assessment of the range of likely impacts and portioning of flow from the ocean and inland aquifers (Appendices A3 and QQQQ - Geosyntec 2015, 2017).

(2) an assessment of the effects of the lateral model boundaries.
Poseidon Response: As discussed above, the lateral model boundaries are physically-based and the Talbert Injection Barrier constant head boundary is based on measured groundwater water levels and assumes the injection barrier is operated to maintain existing aquifer replenishment, which OCWD requires.

It is possible that HydroFocus’ reference to lateral boundaries refers to the no flow boundaries parallel to the margins of the Talbert Gap. The lateral extent of the Talbert Aquifer in the model is consistent with well-documented hydrostratigraphy and regional models (e.g. CDM, 2000; Herndon and Bonsangue, 2006). The lateral extent of the underlying aquifer system in the model is substantially larger than the Talbert Aquifer, the extent of which is limited to the Talbert Gap. The boundary conditions of the deeper aquifer system are thousands of feet beyond the extent of the Talbert Aquifer and purposely far away from the pumping in the Talbert Gap, so the boundary conditions have little influence on the model results (See Appendix K - Figure 12, Geosyntec 2013a). The deep aquifer system boundaries could be extended still further away from the Talbert Gap, but this would make little difference on the model results. The no-flow model boundary conditions constrain the flow pathlines to be parallel to the boundary at the margins in the lower aquifer system, and consequently these pathlines go to the upgradient specified head boundaries for the lower aquifers system. A purpose of the model is to estimate the portion of the slant well pumping that is derived from inland aquifers, but the flowpath directions in the deep aquifer system thousands of feet below the slant well openings and well beyond the extent of the Talbert Gap is not relevant to the model.

(3) correction of inconsistencies in model construction.

Poseidon Response: It is unclear what HydroFocus means by inconsistencies in the model construction. Perhaps they are referring to the areas of Layer 1 over the ocean without specific ocean head, which, as explained above, are a consequence of topographic interpolation and layer geometry, and revision of the model to assign the ocean head to underlying layers in these area results in less than one percent difference in the model portioning of flow to the slant wells from the ocean and inland.

HydroFocus also comments that the basis for the distribution of the constant head cells that represent the marsh and wetland areas is not explained. Please note that as agreed with the WIT and Coastal Commission staff, fixed head of 0.57 to represent connection to the ocean
was specified for 10 to 25% of the model grid cells in Layer 2 for each wetland area, based on the portion of wetland areas that are open water on aerial photos.

Perhaps by “inconsistencies”, HydroFocus is referring to the variable dimensions of the grid cells. However, MODFLOW allows variable grid spacing, which provides flexibility to make cells smaller in areas where resolution of steeper hydraulic gradients is needed, or properties vary on a smaller scale (e.g. Reilly and Harbaugh, 2004; Anderson and Woessner, 1992; Mehl et al., 2006). Mehl et al, 2006 documented a test case example where a properly designed variable spaced grid resulted in discrepancies of 0.023% and 0.034% for head and flux results, respectively, compared to the “true” result for a uniform fine grid. The volumetric flux errors for the slant well models are negligible. For example, for the V6-2 model run discussed above, the volumetric flux balance error was less than 0.01%.

(4) calibration/verification using water level data.

Poseidon Response: As discussed above, the models were developed as screening tools to evaluate feasibility of slant wells and evaluate likely impacts of pumping. The specified head boundary conditions are based on measured water level data, so calibrating the models to the measured water levels would be inappropriate. The models were not calibrated, but the model design and assigned properties are based on abundant data including hydraulic testing data (Geosyntec, 2013b) and existing models including the OCWD model that is used as a tool for optimizing operation of the Talbert Injection Barrier (CDM, 2000).

(5) incorporation of the US Geological Survey MODFLOW Subsidence Package to preliminarily evaluate the subsidence potential due to slant well pumping. The improved model can then be used to more effectively simulate potential impacts and project feasibility.

Poseidon Response: We agree that subsidence could occur in areas where fine-grained sediments are dewatered. In fact, the Project’s 2005 FREIR, 2010 FSEIR and 2012 NPDES Permit found that SSIs could cause subsidence. (See Appendix C - Renewal of Waste Discharge Requirements for Poseidon Resources (Surfside) L.L.C., Huntington Beach Desalination Facility, Order No. RB- 2012-0007, NPDES No. CA8000403).
5. **HydroFocus Sensitivity Runs (Appendix A).**

**Poseidon Response:** Appendix A to the HydroFocus report presents the model results for 9 versions of the model reported by Geosyntec (2015) (see Appendix A3) and 19 revised versions of the model developed by HydroFocus for sensitivity analyses.

For the 9 versions of the model reported by Geosyntec, the average portion of the water pumped by the slant wells that is derived from the inland aquifers (mainly from the Injection Barrier) is 15.0 percent.

For the 19 additional versions of the model developed HydroFocus, the average portion of the water pumped by the slant wells that is derived from the inland aquifers (mainly from the Injection Barrier) is 9.1 percent. However, for 7 of the additional model runs HydroFocus assigned hydraulic conductivities of \( Kh = 80 \) ft/d and \( Kv = 8 \) ft/d, which are much too high for the generally fine-grained sediments above the Talbert Aquifer.

Also, for 6 of the additional model runs, HydroFocus assigned a constant head elevation of sea level (0 ft msl) at the inland model boundary, which represents the Talbert Injection Barrier. This is inconsistent with the observed groundwater conditions near the injection barrier and represents curtailment or drastic decrease of a crucial component of OCWD’s aquifer replenishment program. Injection of recycled water at the Talbert Barrier has been occurring for more than 35 years and is critical for sustaining groundwater production in Orange County. Accordingly, the model runs without significant injection at the Talbert Barrier represent unacceptable scenarios.

For the remaining 10 HydroFocus versions of the model that are relatively useful, the average portion of water pumped by the slant wells that is derived from the inland aquifers (mainly from the Injection Barrier) is 11.4 percent, which would interfere with the aquifer replenishment provided by injection at Talbert Barrier.

We note that these 10 HydroFocus versions of the model all use \( Kh \) and \( Kv \) of 10 and 1 ft/d for the generally fine-grained sediment overlying the Talbert Aquifer. As well documented and discussed above, Geosyntec originally assigned the \( Kh \) and \( Kv \) values of 10 and 1 ft/d to these sediments to represent a very optimistic hydraulic connection between the slant wells and the ocean to provide an estimate of the maximum contribution from the ocean to the slant well pumping. Note that CDM (2000) report a range of 0.01 to 0.04 ft/d for the hydraulic
conductivity of the fine-grained sediments overlying the Talbert Aquifer (Geosyntec, 2013b).

The Coastal Commission’s independent model reviewer (See Appendix L – December 18, 2015 memo “Review of groundwater flow modeling developed by Geosyntec to simulate pumping from slant wells beneath the beach in Huntington Beach” by Dr. Russell Detwiler) and the WIT review panel that worked with the Coastal Commission on requesting additional model sensitivity runs indicated that the Kh and Kv values of 10 and 1 ft/d were too high. Consequently, they concluded that the model likely underestimated the contribution from inland aquifers to the slant well pumping.

The WIT panel and Coastal Commission agreed that the hydraulic conductivity values assigned to the model layers representing the sediments overlying Talbert Aquifer should be ten times lower (Kh and Kv of 1 and 0.1 ft/d) for the base case model. Geosyntec Model Run V6A uses the lower more realistic values for the sediments overlying the Talbert Aquifer, and as shown by Appendix A of the HydroFocus document, the resulting contribution to the model slant well pumping from inland aquifers increases from approximately 10 to 20 percent.

As was recommended, subsequent sensitivity runs and additional model revisions (See Appendix A3 and QQQQ - Geosyntec, 2015, 2017) use Kh and Kv of 1 and 0.1 ft/d for the sediments overlying the Talbert Aquifer.

The hydraulic conductivity of the sediments overlying the Talbert Aquifer, particularly the vertical hydraulic conductivity (Kv), determines the degree of hydraulic connection between the slant wells and the ocean. Therefore, the value assigned in the model to this parameter is a key influence on the percentage of water derived from inland aquifers, as is illustrated by the graph below (See Appendix A3 - from Fig 24, Geosyntec, 2015).
The additional sensitivity runs reported by HydroFocus are of limited value because they neglected to use the recommended revised base case values of Kh and Kv of 1 and 0.1 ft/d, or lower values, for the model layers overlying the Talbert Aquifer for any of their model runs.

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INTRODUCTION

Hanemann: The ISTAP reports are being relied upon by the Applicant as evidence that sub-surface intakes are neither technically nor economically feasible, making the Poseidon project eligible for an exemption to the regulatory preference compelling the use of sub-surface intakes.

Poseidon Response: Poseidon is not relying exclusively on the Coastal Commission’s ISTAP Phase 1 and Phase 2 reports (see Appendices F and G) to support a determination that subsurface intakes are infeasible. Instead, Poseidon is relying on the entirety of the Project’s fifteen-year permitting history and the extensive evaluation of subsurface intake feasibility including but not limited to the Project’s 2005 FREIR, 2010 FSEIR, 2012 Regional Board NPDES Permit and State Lands Commission’s 2017 FSEIR (See Appendix C; Appendix D; Appendix J; Appendix F and G).

Nonetheless, the Regional Board’s website lists over 100 Project reports, including the results of the only independent subsurface intake feasibility reviews, which were conducted by the ISTAP and WIT. Also, only Geosyntec’s Talbert Aquifer model has been used in an independent process (WIT) and the results were independently peer reviewed. (See Appendix A3 and Appendix L, L2, L3 and QQQQ).

The work of ISTAP and the WIT were independent because the California Coastal Commission staff (“Commission staff”) and Poseidon agreed to establish the investigation and contracted with CONCUR Inc., to develop an independent joint fact-finding process. With CONCUR, Commission staff and Poseidon jointly developed Terms of Reference (TOR). The TOR framed the topics for investigation, defined the recruitment criteria for experts, and defined the method for panel selection. It also included the stakeholders’ agreement to conduct the investigation in at least two distinct phases:

- Phase 1 would focus on reviewing the technical feasibility of subsurface intake technologies (that is, whether various subsurface intakes could be built and operated using currently available methods), and
Phase 2 would focus on examining the technically feasible options from Phase 1, relative to a broader range of criteria such as size, scale, cost, energy use, and characteristics related to site requirements and environmental concerns as compared to the proposed open intake. The criteria for feasibility in both phases were derived from the Coastal Act and CEQA definitions of feasibility (i.e., “capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors”). (See Pub. Resources Code §§ 30108, 21061.1.)

The ISTAP and WIT were not only independent, but they were composed of experts that were jointly selected by Commission staff and Poseidon from multiple relevant disciplines. The TOR included agreed-upon qualifications and recruitment criteria for panel members, which for Phase 1 included:

- Subsurface intake design, construction, and/or operation;
- Geophysical and/or hydrogeological study design and modeling;
- Coastal processes and/or physical oceanography- hydrodynamics, sediment transport sediment characterization, etc.;
- Coastal engineering/construction methods/cost analysis; Geophysical and/or hydrogeological characteristics of Orange County coastal areas; and
- Groundwater geochemistry.

From the start, the ISTAP process emphasized hydrogeology. The ISTAP Phase I (technical feasibility) panel members included three expert hydrogeologists: Thomas Missimer, Ph.D. Missimer Hydrological Services; Robert Maliva, Ph.D., Schlumberger Water Services USA; and Martin Feeney, PG CEG CHg, Independent Consultant. The other Phase 1 panelists were Michael Kavanaugh, Ph.D., P.E., BCEE, Geosyntec Consultants; and. Robert Bittner, P.E., Bittner-Shen Consulting Engineers.

The ISTAP Phase 1 report found that seawater wells (i.e., vertical wells completed in the shallow aquifer above the Talbert aquifer; vertical deep wells completed within the Talbert aquifer; vertical wells both above and below the Talbert aquifers; slant wells completed in the Talbert Aquifer; and radial collector wells tapping the shallow aquifer) are technically infeasible for the proposed Project due in part to: (a) performance risk; (b) local hydrologic conditions that would result in adverse environmental impacts including to fresh water aquifers and local wetlands; (c) sensitivity to sea level rise; (d) poor geochemistry and (e) lack of precedent in similar geological conditions (See Appendix F).

At the close of Phase 1, Commission staff requested that different scales of intake well designs undergo further review. In response, CONCUR worked with Commission staff and Poseidon to analyze the effects of wells operating at different intake volumes on the Talbert Aquifer. The stakeholders agreed to jointly develop the
independent WIT to run in parallel to the Phase 2 panel. The WIT would further investigate the feasibility of well technologies by providing advice to stakeholders on the selection and development of a model to determine the effects these wells would have on the nearby Orange County Groundwater Basin. Two hydrogeologists who served on the Phase 1 panel were appointed to the WIT. At the advice of the WIT, the stakeholders also retained a hydrogeology modeler and a third-party reviewer – the modeler selected, generated and refined a model and the third-party reviewer provided a close review of the parameters and boundary conditions used in this model (McCreary 2016). \textit{(See Appendix A3 and L)}.

Under direction from the primary WIT members, the modeler was retained to run a groundwater flow model to determine the effects of alternative well intake methods on the Talbert Aquifer and Orange County Groundwater Basin (McCreary 2016) (Geosyntec 2013b).

The analysis indicated that well pumping at different potential intake volumes would result in various levels of drawdown in the Orange County Groundwater Basin, thus potentially interfering with the performance of the Talbert Injection Barrier, which the OCWD operates to reduce seawater intrusion into the basin\textsuperscript{i} \textit{(See Appendix A3)}. These findings reinforce the Phase 1 findings that these well technologies result in various levels of drawdown that are unacceptable to OCWD \textit{(see Appendix L2 and L3)}.

In his evaluation, the Coastal Commission staff-selected third-party reviewer concluded that the model and model inputs provide a reasonable representation of the Talbert Gap flow rates, hydraulic parameters, and effects on the Talbert Aquifer \textit{(See Appendix L)}. The WIT and stakeholders reviewed these findings, and the stakeholders concluded that the findings of the WIT should be deemed complete and that no further modeling investigation was needed.

ISTAP Phase 2 (broader range of feasibility factors) panelists included Phase 1 panelists Robert Bittner, Michael Kavanaugh, and Thomas Missimer. In addition, Larry Dale, Lawrence Berkeley National Laboratory, Resource Economist; Janet Clements, Stratus Consulting, Resource Economist; and Susan Lee, Aspen Environmental Group, Environmental Assessment expert were added to the Phase 2 panel.

Another unique attribute of the ISTAP process compared to other documents in the Regional Board record was that it included public participation in the form of draft
reports that were posted on the Coastal Commission website and public work sessions. The ISTAP reports were independent expert reviews with multiple opportunities for public participation. The Phase 1 report concluded that, of the nine subsurface intake technologies reviewed, only the seabed infiltration gallery and the surf zone (beach) gallery might be technically feasible. The Phase 2 report found that the beach infiltration gallery is technically infeasible and that the seabed infiltration gallery option is not economically viable at the Huntington Beach location within a reasonable time frame, due to high capital costs and only modest reduction in annual operating costs.

The ISTAP and WIT reports were prepared for the Coastal Commission’s separate permitting process. They were not intended to fulfill all of the requirements of the Regional Board’s process, but they are, nevertheless, part of Poseidon’s record and can be used to inform the Regional Board’s independent analysis.

Poseidon has since been working with the State and Regional Boards’ staffs and an interagency group to provide additional support for the Regional Board’s OPA compliance determination. Additional analysis includes looking at alternative sites and scales utilizing (when appropriate) the Talbert Aquifer model used by the independent WIT and peer reviewed by Detwiler.

The process followed by the Water Boards’ staffs has been to use the Talbert aquifer model (used by the independent WIT and independently peer reviewed) and similar additional models to evaluate maximum achievable rate of extraction by subsurface intakes at alternative sites to determine the maximum yield of slant wells that would not have a negative impact on groundwater resources, seawater intrusion barriers, coastal wetlands and existing contaminated groundwater plumes.

Hanemann: The ISTAP Phase 1 report erred in finding that slant wells are not technically feasible for the proposed facility.

Poseidon Response: See above response. The ISTAP is the most comprehensive and independent, site-specific evaluation of subsurface seawater intake technology feasibility ever conducted in the state. Further, the ISTAP Phase 1 report conclusions are consistent with prior conclusions reached by the City of Huntington Beach in 2005 and 2010 and the Regional Board in 2012, as well as with the State Lands Commission’s 2017 SEIR (See Appendix C, D and J).

Hanemann: The ISTAP Phase 2 report did not adequately demonstrate that subsurface intakes are not economically feasible for the proposed facility.
Poseidon Response: The ISTAP Phase 2 report confirms that the subsurface intake economic infeasibility determination does meet the OPA’s requirements and was based on a wide range of considerations including: life cycle cost analysis; cost of product water (“willingness to pay”); whether project revenues would cover costs; ability to secure project financing; Poseidon’s willingness to proceed given the SIG’s economic disparities; and whether the SIG could be successfully accomplished in a reasonable period of time, consistent with CEQA’s and the OPA’s definition of “feasible” (See Appendix QQ – whitepaper entitled “Response to questions about Independent Scientific Technical Advisory Panel (ISTAP) Phase 2 Report related to Economic Analysis for the Huntington Beach Desalination Project” and Appendix AAAA “ISTAP Project and Life Cycle Cost Analyses were Consistent with the OPA” dated December 5, 2016).

Hanemann: Because the Phase 1 report erred in dismissing slant wells, the Phase 2 report lacked any analysis of the economic feasibility of slant wells and or similar subsurface technologies. The lack of an economic analyses of slant wells is a significant flaw because the construction cost of slant wells is lower than that of the Seawater Infiltration Galleries analyzed in the ISTAP Phase 2 report.

Poseidon Response: See above response. CEQA, the Coastal Act, and the OPA uniformly define feasible as “capable of being accomplished in a successful manner in a reasonable period of time taking into consideration environmental, technical, social and economic considerations.” There is no legal requirement that slant wells must also be deemed economically infeasible if already found to be any one of environmentally, technically or socially infeasible, or if slant wells cannot be successful accomplished in a reasonable period of time.

Hanemann: Other desalination projects in California proposing to use slant wells have shown that technical risks with slant wells can potentially be mitigated and that there would be significant savings in the costs of operation and maintenance compared to the screened open ocean intakes proposed for the Huntington-Poseidon project.

Poseidon Response: We agree that slant well projects have been proposed and impacts could “potentially” be mitigated. However, there are no seawater desalination plants using slant wells that have successfully completed the CEQA process and obtained all necessary permits from state agencies including the applicable Regional Water Quality Control Board, Coastal Commission and State Lands Commission. In fact, the proposed CalAm slant well desalination project EIR/EIS states section 8-2-74 states, “Although the test slant well at CEMEX is not the first of its kind, to the best of the Lead Agencies’ knowledge, slant well technology has not yet been used for a full-scale desalination project.” And “…the Doheny test slant well was the first test slant well designed for seawater intake.”
Further, the OPA requires a site and project-specific environmental review. Geologic and hydro-geologic conditions vary along the coast of California.

Further, ISTAP Phase 2 (See Appendix G) evaluated the potential operational and maintenance savings associated with subsurface intakes, and that analysis did not alter the ISTAP’s conclusion that subsurface intakes would be infeasible.

Hanemann: I have concluded that the ISTAP Phase 1 and Phase 2 reports are inadequate for showing that slant wells are neither technically nor economically feasible according to the requirements set forth in the Ocean Desalination Amendment to the California Water Quality Control Plan for Ocean Water.

Poseidon Response: See above responses.

**BEST AVAILABLE SITE, BEST AVAILABLE DESIGN, BEST AVAILABLE TECHNOLOGY**

Hanemann: Article III.M.2.a(2) of the 2015 Ocean Amendment states: “The regional water board shall conduct a Water Code section 13142.5(b) analysis of all new and expanded desalination facilities. … The regional water board shall first analyze separately as independent considerations a range of feasible alternatives for the best available site, the best available design, the best available technology, and the best available mitigation measures to minimize intake and mortality of all forms of marine life. Then, the regional water board shall consider all four factors collectively and determine the best combination of feasible alternatives to minimize intake and mortality of all forms of marine life.” Another article, III.M.2.b(2), requires the owner or operator of a new facility to: “Consider whether the identified need for desalinated water is consistent with an applicable adopted urban water management plan prepared in accordance with Water Code section 10631, or if no urban water management plan is available, other water planning documents such as a county general plan or integrated regional water management plan.” Furthermore, article III.M.2.d.(1)(a) states in part: “A design capacity in excess of the identified regional water need for desalinated water shall not be used by itself to declare subsurface intakes as infeasible.”

Based on my understanding of the history of the Poseidon project as recounted in the ISTAP Phase I (pp. 5-9), it does not appear that the site and size of the Poseidon facility were subjected in either ISTAP Phase 1 or Phase 2 reviews to the analysis called for in the 2015 Ocean Amendment.
Poseidon Response: ISTAP was not charged with conducting a Water Code 13142.5(b) determination as identified in the OPA and reserved for the state’s Regional Water Quality Control Boards. Nevertheless, the ISTAP’s analysis was performed with the intention that it would be consistent with the OPA’s requirements. The proposed site and alternative sites (See Appendices E, 001, 002, AAA, BBB, OOOO, PPPP, QQQQ and RRRR) and capacity (See Appendices LL1, LL2 and NN) of the desalination plant has undergone significant review since Poseidon submitted its application to the Regional Board in June 2016. Alternatives analysis were also conducted by the City of Huntington Beach in its 2005 FREIR and 2010 FSEIR as well as the Regional Board’s 2010 NPDES permit (See Appendix C). The conclusions in those documents were recently confirmed by the State Lands Commission in its 2017 SEIR.

Hanemann: Rather than emerging as the outcome of a selection process which identified them as the best alternative in order to minimize the intake and mortality of marine life, the site and scale of the Huntington Beach proposal have been a fixed datum since the project’s inception twenty years ago.

Poseidon Response: See above response. The scale of the Huntington Beach Project is based on meeting the Project’s objectives, which include using proven technology to affordably provide a long-term, local and reliable source of water not subject to the variations of drought or regulatory constraints; reducing local dependence on imported water and strengthening regional self-reliance; and contributing desalinated water to satisfy regional water supply planning goals. These project objectives are identified in the City of Huntington Beach’s 2005 certified FREIR and 2010 FSEIR and have remained unchanged (See Appendix D and J). In addition, through the use of technological enhancements, Poseidon is now able to reduce the Project’s seawater intake, a revision which Hanemann ignores.

Hanemann: Moreover, the scale was not justified on the basis of analysis in an urban water management plan.

Poseidon Response: As discussed in the detailed responses to the Fryer report, above, this statement is incorrect (See Appendices N, O, P2, EE, FF, GG, LL1, LL2, MM and WW). The Project is identified in applicable water planning documents.

Hanemann: In fact, Orange County overlies a large groundwater basin allowing the water agencies many alternatives for reliable water supplies that are not available in San Diego County where there is limited groundwater storage availability.
Poseidon Response: See Appendices MM, WW and LL1, LL2 and NN and numerous other correspondence from OCWD identifying its need and intent for the desalinated water.

Hanemann: In short, the 50 mgd scale of the Huntington Beach facility was a pre-determined decision made without the identification of any discrete need for 50 mgd of supplemental water in any Urban Water Management Plan from 2002 through the most recent plan adopted for 2015.

Poseidon Response: As discussed in the detailed responses to the Fryer report, above, this statement is incorrect. (See Appendices C, D, J, MM, WW and LL1, LL2 and NN). The Project is identified in applicable water planning documents.

Hanemann: Whether intentionally or not, the a priori specification of a 50 mgd scale facility without consideration of alternative, smaller scales, may indeed have performed the function of “gaming” the Ocean Amendment process by providing an excuse to declare an otherwise feasible subsurface intake technology as not feasible for the Huntington Beach facility.

Poseidon Response: The ISTAP and WIT processes did evaluate subsurface intakes at different scales (See Appendix F and G). ISTAP did not determine subsurface intakes were infeasible based exclusively on scale.

As part of the Regional Board’s application process, Poseidon has evaluated subsurface intakes of various scales at alternative sites (See Appendix OOOO, PPPP, QQQQ and RRRR).

Furthermore, alternative project scales were evaluated throughout the Project’s CEQA certification process, which started in 2005 and has included three Environmental Impact Reports as well as the Regional Board’s 2012 Water Code Compliance determination (See Appendix C, D and J).

Hanemann: If the applicant is requesting a permit for a facility using an open ocean intake, the applicant must document a demand for the volume of product water that could not be met with alternative sources (eg, “other water supply options like recycled water”) and/or a combination of subsurface and open ocean intakes.

Poseidon Response: This alleged requirement is not contained in the OPA. The OPA Staff Report states: “A goal of the proposed Desalination Amendment is to support the use of ocean water as a reliable supplement to traditional water supplies while protecting beneficial uses. Desalination is another water supply option that can be used in conjunction with other water supplies to ensure areas can meet their water demands. The proposed Desalination Amendment would establish an analytical
framework for evaluating proposed desalination projects that would use seawater in order to increase availability of potable water supplies. It is up to water providers to evaluate various supply options and costs and impacts of each to make informed decisions about future supplies. Selecting water supply alternatives at a local, regional, or statewide level is not the State Water Board's role and the State Water Board does not propose to prioritize or rank water supply options on a statewide level.” (See Appendix NN).

Hanemann: The ISTAP reports did not meet this requirement. They did not address the question of whether there was a documented need for 50 mgd of water from a seawater desalination facility that could not be met with alternative sources.

Poseidon Response: See above responses.

TECHNICAL FEASIBILITY

Hanemann: The definition of technical feasibility employed in ISTAP Phase 1 differs in two significant ways from that used in the 2015 Ocean Amendment. The criteria relating to impact on freshwater aquifers, local water supply, and existing water users, desalinated water conveyance, existing infrastructure, and co-location with sources of dilution water were omitted in the final Amendment.

Poseidon Response: Hydrogeology was not dropped from the OPA and is a required part of a feasibility assessment. According to the State Board staff presentation on May 6th, 2015, staff recommended removing factors in the Technology section that were not necessarily related to the intake and mortality of all forms of marine life. They noted that other factors related to subsurface feasibility would be addressed through the CEQA process.

This comment demonstrates a lack of understanding of hydrogeology and the importance of this type of analysis to the feasibility of subsurface intakes. Hydrogeology has been recognized by the State Board as a necessary analysis for determining subsurface intake feasibility. Indeed, the State Water Board Resolution adopting the Ocean Plan Amendment finds that: “The State Water Board has identified potentially significant impacts to hydrology and water quality resulting from reasonably foreseeable methods of compliance with the proposed Desalination Amendment. These impacts include the potential for operation of subsurface wells to cause or exacerbate saltwater intrusion into freshwater aquifers or alter groundwater flow to freshwater aquifers and wells. Pursuant to express terms of the Desalination Amendment, the feasibility determination for subsurface intakes will entail analysis of issues that include hydrogeology. As a result, a proposed facility that with apparent potential to result in such impacts is unlikely to be approved. However, due to the site-specific nature of this determination, the potential for such impacts is uncertain
and is appropriately addressed more extensively in a project-specific CEQA analysis. Regardless, the State Water Board has identified potential mitigation measures available for these methods of compliance that may reduce or eliminate those impacts in the event that these impacts nonetheless occur. These measures include reducing pumping rate or potentially relocating wells. ”(Resolution 2015-0033, ¶ 29.)

**Hanemann:** ISTAP Phase 1 rejects slant wells as an option because they “would draw large volumes of water from the Orange County Groundwater Basin, which in itself is considered a fatal flaw” (p. 56). From my perspective as an economist, this is not a valid criterion of technical feasibility – it is an economic consideration.

**Poseidon Response:** The importance of hydrogeology and hydrology were emphasized throughout the development of the OPA, as highlighted in State Board staff’s response to a comment letter from Coastkeeper dated August 19, 2014.

Comments: “Therefore, we believe the definition of “not feasible” in the Amendment should be: “Cannot be constructed or operated given geotechnical data, hydrogeology, benthic topography, or oceanographic conditions. Cannot be accomplished because of the inability to obtain necessary permits due to unacceptable environmental impacts, local ordinances, State or local regulations, etc.”(August 19, 2014 Comment Letter – Desalination Amendment On behalf of the undersigned organizations, we appreciate the opportunity to provide comments on the State Water Resources Control Board’s (“State Board”) July 2014 draft Desalination Amendment (“Amendment”). (CCA p.2)

Staff response to comments: Discussion of impacts to hydrology is not, as the commenter suggests, limited to a single paragraph. Potential impacts to hydrology and water quality are identified in sections 12.1.9 and 12.4.5 in the Staff Report with SED. Further, there is an extensive discussion of potential impacts to hydrology and water quality in Section 8 including the proper siting of intake facilities to prevent salt water intrusion (see Section 8.4.2). Specifically, within Section 12, potential impacts to hydrology and water quality are identified in sections 12.1.9 for desalination projects that have already conducted project level CEQA.

Based on the evaluation found in the CEQA checklist (Appendix B), staff determined that additional evaluation was required to address the potential impacts to groundwater resources. In Section 12.4.5, staff evaluated which (if any) of these impacts would be different, or if there might be new impacts resulting from the proposed amendment. The discussion for Alternative 2 references the same potential impacts as identified in Alternative 1. While the analyses in section 12.1 are quantitative and detailed, the analyses in Section
12.4 are necessarily less detailed and more qualitative. This is appropriate for a programmatic level CEQA analysis where the site, design, technology, and mitigation measures are not known for all facilities. A site-specific analysis for individual projects should be done during the environmental review of those projects, not in this programmatic Staff Report with SED. (p. H-106 -13.49)

In 2014, the ISTAP convened by Poseidon and the Coastal Commission issued a Phase 1 feasibility report that found that seawater wells are technically infeasible for the proposed Project due to: (a) performance risk; (b) local hydrologic conditions that would result in adverse environmental impacts including to fresh water aquifers and local wetlands; (c) sensitivity to sea level rise; (d) poor geochemistry; and (e) lack of precedent in similar geological conditions (see Appendix F).

In addition to the Project’s three Environmental Impact Reports, the Regional Board’s 2012 Water Code Compliance determination, and the ISTAP reports, there has been several subsequent hydrogeologic studies that are part of the administrative record for this project (See Appendices A1, A2, A3, K, HHH, QQQQ). Some of these efforts are identified in 18 January 2017 Geosyntec report (See Appendix III) as a description of background:

In 2015, at the request of the California Coastal Commission staff, a Well Investigation Team (WIT) comprised of independent, professional hydrogeologists that served on the ISTAP Phase 1 panel were appointed to further investigate and analyze the potential impact that seawater intake wells could have on the local freshwater basin managed by the Orange County Water District (“OCWD”). The WIT reviewed the modeling of the hypothetical slant wells (Geosyntec 2013) and requested revision of the representation in the model of the coastal wetlands and marshes and sensitivity analyses of the model results to values assigned for hydraulic conductivity, pumping location, and pumping rate. Geosyntec conducted the requested sensitivity analyses and presented a range of model results with respect to the portion of the sources of the water pumped from the slant wells including the ocean, the coastal wetlands, and the inland aquifers (Geosyntec, 2015).

The initial model simulations of pumping from slant wells under the beach (Geosyntec 2013), which included an optimistically high hydraulic conductivity for the shallow sediments between the ocean and the Talbert Aquifer, showed approximately 10 percent of the pumped water coming from inland aquifers. Results of revised modeling requested by the WIT for sensitivity analyses with lower hydraulic conductivity for the shallow sediments between the ocean and the Talbert Aquifer, showed 22 to 36 percent of the pumped water coming from inland aquifers (Geosyntec, 2015). The hydraulic conductivity assigned to the shallow sediments in the model version that showed 22 percent of the
pumping water coming from inland aquifers is considered more realistic than the optimistically high hydraulic conductivity assigned in the initial model, which was intended to provide a screening level maximum production estimate for the slant wells. The groundwater modeling and sensitivity analyses was validated by the WIT.

OCWD participated in the WIT process and in response to documentation of the model sensitivity analyses (Geosyntec, 2015) issued a letter on September 28, 2015 stating:

Based on the modeling parameters used and the overall hydrogeologic setting of the Talbert Gap that OCWD staff has studied for decades, these results appear reasonable and could, in fact, still underestimate the proportion of inland groundwater extracted by a SSI. Geosyntec also found that lowering the total SSI extraction rate produced a slight increase in the proportion of inland groundwater being extracted by the SSI.

Based on the results presented by Geosyntec, it is OCWD staff’s position that a SSI constructed within the Talbert aquifer near the coast would produce an unacceptable amount of inland groundwater that would reduce the yield of the groundwater basin and, likewise, would effectively reduce the net yield of “new” water produced by an ocean desalination project. Not only would such a reduction in net yield of an ocean desalination project undermine its objective of increasing water reliability, but it would cause the project to be economically infeasible. For these reasons, OCWD staff would not be in favor of continued consideration of a SSI option for the Huntington Beach Seawater Desalination Project.

In December 2015, Professor Detwiler (2015), an independent, third-party reviewer chosen by Coastal Commission staff, reviewed the original modeling and sensitivity analyses (Geosyntec 2013, 2015). In response to Dr. Detwiler’s third-party review, OCWD issued a letter on February 12, 2016 stating: OCWD Staff concurs with Dr. Detwiler’s conclusion that the groundwater model may under-predict the amount of source water to the SSI system that is derived from inland areas and may over-predict the amount of water that is derived from the ocean. This is due to seismic survey indications of off-shore aquifer discontinuities, e.g., faulting, and indications of reduced hydraulic conductivity, neither of which were included in the model. Representing these offshore geologic variables in the model would further reduce the source water available from the ocean and increase the contribution from inland freshwater resources to the yield of the SSI well system – beyond the already unacceptable (to OCWD) proportions presented by Geosyntec … OCWD staff’s comments herein are consistent with those stated in our September 25,
2015, letter to CONCUR. We reiterate that a SSI constructed within the Talbert aquifer near the coast would produce an unacceptable amount of inland groundwater that would reduce the yield of the groundwater basin and, likewise, would effectively reduce the net yield of “new” water produced by an ocean desalination project. For these reasons, again, OCWD staff would not be in favor of continued consideration of a SSI option for the Huntington Beach Seawater Desalination Project.

Poseidon presented additional reports supporting these subsurface intake findings including Geosyntec’s use of a Talbert Aquifer model. Geosyntec had reviewed offshore and onshore hydrogeologic data and developed a three-dimensional numerical model of the Talbert Gap area as a tool to simulate groundwater flow to assess the feasibility of subsurface collectors beneath the shoreline to provide source water to the proposed Desal Facility at the design flow rate of 127 MGD. The model was designed to specifically simulate a series of slant wells, but the results are also applicable to other coastal margin subsurface collector alternatives. This report concluded that:

“As a result of this overlying confining layer, pumping large quantities of water from the Talbert Aquifer would create large amounts of drawdown of groundwater levels over a large area, and the water flowing to the wells beneath the shoreline would come from inland aquifers, the Santa Ana River, wetlands, and marshes as well as from the ocean. Accordingly, from a hydrogeological perspective, any subsurface collectors (vertical wells, horizontal wells, slant wells, and infiltration galleries) constructed to obtain water from the Talbert Aquifer beneath the Huntington Beach shoreline would encounter the same limitations regarding aquifer extent, structure, and associated yield, and thus are not feasible as an alternate source for the 127 MGD of intake water needed for proposed Desal Facility.”

In 2016, as part of its evaluation of the proposed Project’s compliance with the OPA, the Regional Board requested evaluation of the technical feasibility of increasing the length of the hypothetical slant wells to position them further offshore with the objective of avoiding substantial influence on local wetlands and the inland Talbert Aquifer. In response, Poseidon engaged Geosyntec to make further revisions to the groundwater flow model to evaluate the potential benefit of extending the slant wells further offshore. Based on known drilling and well installation limitations on the likely maximum technically feasible length of slant wells, Geosyntec increased the hypothetical slant wells from a length of approximately 425 to approximately 1000 feet in the updated model (See Appendix HHH).

The additional modeling indicates that variation in the location and length of the slant wells by several hundred feet has very little influence on the portions of source water pumped by the slant wells. Vertical hydraulic conductivity of the strata overlying the
Talbert Aquifer is the most important parameter that influences the relative portions of water from the ocean and inland aquifers that would flow to the hypothetical slant wells. Specifically, Geosyntec noted:

“In conclusion, regardless of the location of the length of hypothetical slant wells beneath the Huntington Beach coastline, very optimistic screening modeling indicates that the pumping would influence the performance of the Talbert Barrier and reduce the effectiveness of aquifer replenishment, and more realistic modeling, indicates that the pumping would have a major influence on the performance of the Talbert Barrier and prevent effective aquifer replenishment. The large drop in the water table that would be caused by pumping of groundwater along the coastal margin of Huntington Beach would result in significant impacts to coastal wetlands and marshes and could also cause subsidence of the ground surface that could impact the structural integrity of the Pacific Coast Hwy and structures in the vicinity.”

Hanemann: The drawdown of aquifer water is a factor that increases the effective cost per mgd supplied via desalination using a slant-well intake but, by itself, it does not constitute a “fatal flaw.” This may be why SWRCB dropped “impact on freshwater aquifer” from its criteria for technical feasibility.

Poseidon Response: Throughout the development of the OPA, the critical relationship of hydrology and water quality with desalination projects was documented. The State Board’s Staff Report and SED specifically considered water quality, as excerpted below:

The OPA includes:

12.1.9 Hydrology and Water Quality Desalination projects in general can have significant impacts to hydrology and water quality if a project were to cause or result in: • Violation of any water quality standards or WDRs • Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted) (Draft OPA Staff Report, p. 157.)

12.4.5 Hydrology and Water Quality Alternative 1 would have similar construction related impacts as those described in section 12.1.9. As such, it is unlikely that construction and operation of a coastal desalination facility would alter the drainage of streams or rivers, place housing or structures within flood plain, or redirect or impede flood waters, or expose people or structures to significant risk or loss due to flooding. It is possible that a
subsurface intake could cause or exacerbate saltwater intrusion into freshwater wells, but it is unlikely that the regional water boards or other permitting agencies would approve such a project. One important factor to consider would be the quality (p. 190) and quantity of water to be pumped into the intake system. Another important factor to consider is the yield required to meet the anticipated need and ability to maintain adequate flows over the life of the project. If surface or subsurface potable water supplies are located nearby, they could potentially be impacted by pumping from subsurface wells. Additional studies may be necessary to assess potential impacts under a range of pumping rates. If pumping from the subsurface intakes has the potential to alter groundwater flow to freshwater aquifers and wells, then the intake may need to either be relocated or flow rates reduced so existing aquifers are not affected.

Alternative 2 would also have construction related impacts from foreseeable intake methods and discharge technologies similar to Alternative 1 and those described in section 12.1.9. As such, it is unlikely that construction and operation of a coastal desalination facility would alter the drainage of streams or rivers, place housing or structures within flood plain, or redirect or impede flood waters or expose people or structures to significant risk or loss due to flooding. Operational impacts would also be similar to Alternative 1, except that the potential for seawater intrusion would be absent from facilities that choose surface water intakes. (Draft OPA Staff Report, pp. 190-191.)

Subsurface intakes are often limited to locations with favorable geological conditions, since aquifer characteristics vary with the geology, structure, and topography of the substrate in which they occur. Detailed hydrogeological and geophysical surveys and mapping are needed to determine the feasibility of installing subsurface intakes. Local geologic conditions will determine the necessary intake design, size, and flow capacity. (OPA Staff Report, p. 64.)

A key factor to consider in siting subsurface intakes is the potential for the subsurface well to contribute to or exacerbate seawater intrusion problems. Seawater intrusion can irreversibly contaminate freshwater supplies, negating the benefit of the desalination facility’s ability to produce potable water. (OPA Staff Report, p. 72.)

Hanemann: ISTAP Phase 1 applies a second criterion for technical feasibility that is also not endorsed by SWRCB. The report states (p. 11): “For the Phase 1 Report, the working definition of “Technical Feasibility” was specified in the expert contract documents as: “Able to be built and operated using currently available methods.”
Thus, an additional reason adduced by the report for declaring a slant-well subsurface intake to be technically infeasible was the following (p. 56): “The performance risk is considered medium, as the dual-rotary drilling method used to construct the wells is a long-established technology, but there is very little data on the long-term reliability of the wells. Maintainability is also a critical unknown issue.” That argument is questionable.

**Poseidon Response:** ISTAP did not rely on a single parameter or criteria to determine subsurface intake feasibility. California Water Code section 13142.5(b) requires the “best available site, design, technology and mitigation measures feasible to minimize the intake and mortality of all forms of marine life.” Further, the OPA defines feasible as “capable of being accomplished in a successful manner in a reasonable period of time taking into consideration environmental, technical, social and economic considerations.”

The ISTAP technical feasibility criteria acknowledged that a subsurface intake technology must be “available,” and in order to be feasible must be “successfully accomplished in a reasonable period of time.” As correctly identified by ISTAP, there is very little data on the long-term operation of wells to definitely determine they can be operated successfully. This is an important consideration for feasibility.

**Hanemann:** As evidenced by the CalAm-Monterey and Doheny desalination project proposals, slant well intakes are considered “technically feasible” regardless of the potential drawdown of inland waters. Clearly the industry disagrees with the ISTAP finding on the feasibility of slant wells based on performance risks, as witnessed by designed and tested proposals to use slant wells for the Doheny and CalAm-Monterey projects.

**Poseidon Response:** See above response. This conclusion is premature and the project comparison inappropriate.

There are no seawater desalination plants using slant wells that have successfully completed the CEQA process and obtained all necessary permits from state agencies including the Regional Water Quality Control Board, Coastal Commission and State Lands Commission, including Doheny and CalAm-Monterey. Further, the OPA requires a site and project-specific environmental review. Geologic and hydro-geologic conditions vary along the coast of California. In fact, the State Board’s OPA Staff Report states: “Subsurface intakes are often limited to locations with favorable geological conditions, since aquifer characteristics vary with the geology, structure, and topography of the substrate in which they occur.” (OPA Staff Report, p. 64.)

**ECONOMIC FEASIBILITY**
Hanemann: The 2015 Ocean Amendment defines feasible thus: “For the purposes of Chapter III.M, [feasible] shall mean capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors” (p. 54). Article III.M.2.d.(1)(a) of the Amendment states: “Subsurface intakes shall not be determined to be economically infeasible solely because subsurface intakes may be more expensive than surface intakes. Subsurface intakes may be determined to be economically infeasible if the additional costs or lost profitability associated with subsurface intakes, as compared to surface intakes, would render the desalination facility not economically viable.” In their response to comments received, the SWRCB noted: “The fact that an alternative may be more expensive or less profitable is not sufficient to show that the alternative is financially infeasible. What is required is evidence that the additional costs or lost profitability are sufficiently severe as to render it impractical to proceed with the project.” As an economist, I would argue that reasonableness in a water purchase agreement requires some form of a cost-benefit test.

Poseidon Response: The ISTAP Phase 2 report confirms that the subsurface intake economic infeasibility determination meets the OPA’s requirements and was based on a wide range of considerations including: life cycle cost analysis; cost of product water (“willingness to pay”); whether project revenues would cover costs; ability to secure project financing; Poseidon’s willingness to proceed given the SIG’s economic disparities; and whether the SIG could be successfully accomplished in a reasonable period of time, consistent with CEQA’s and the OPA’s definition of “feasible.” (See Appendix QQ – whitepaper entitled “Response to questions about Independent Scientific Technical Advisory Panel (ISTAP) Phase 2 Report related to Economic Analysis for the Huntington Beach Desalination Project” and Appendix AAAA).

Hanemann: The ISTAP Phase 2 Report interprets the criterion for the economic viability of an intake technology as an amount “that OCWD might be willing to pay for the water supplied” by the proposed Poseidon facility. From an economic perspective, that interpretation is very problematic.

Poseidon Response: The ISTAP Phase 2 report confirms that the subsurface intake economic infeasibility determination meets the OPA’s requirements and was based on a wide range of considerations including: life cycle cost analysis; cost of product water (“willingness to pay”); whether project revenues would cover costs; ability to secure project financing; Poseidon’s willingness to proceed given the SIG’s economic disparities; and whether the SIG could be successfully accomplished in a reasonable period of time, consistent with CEQA’s and the OPA’s definition of “feasible.” (See Appendix QQ – whitepaper entitled “Response to questions about Independent Scientific Technical Advisory Panel (ISTAP) Phase 2 Report related to Economic Analysis for the Huntington Beach Desalination Project” and Appendix AAAA).
Hanemann: If the Poseidon facility at Huntington Beach had a subsurface intake it would likely provide water at a lower cost than one with an open ocean intake. But, would it be economically viable? Because the necessary economic analysis is lacking in the ISTAP reports, it is an open question in my mind whether such a facility would be economically viable, let alone optimal. There are too many unanswered questions.

Poseidon Response: There is not a single study that has been conducted on subsurface intake for the proposed Huntington Beach Project that has concluded that the cost of water would be lower than a plant using a screened ocean intake. Furthermore, the cost of water is not the only consideration that went into the ISTAP’s conclusion that a seafloor infiltration gallery would not be economically feasible within a reasonable period of time (See Appendix G and QQ). The ISTAP process served to validate prior conclusions on economic feasibility reached by the City of Huntington Beach in its 2005 and 2010 Environmental Impact Reports (See Appendix D and J), the Regional Board’s 2012 order, and the State Lands Commission’s 2017 FSEIR.

Hanemann: It is not obvious just how much a 50 mgd facility, rather than a smaller one, is needed. There are other potential sources of supply for Orange County that would be cheaper. It is unclear how much the facility as planned with OCWD would actually improve the reliability of Orange County’s water supply. It is not obvious whether it is economically sensible to have OCWD as the entity that contracts for the desalinated water.

Poseidon Response: The State Board expressly rejected the notion that there should be a water resource preference, or “loading order”, when determining a proposed desalination project’s compliance with the OPA. The OPA Staff Report states: “A goal of the proposed Desalination Amendment is to support the use of ocean water as a reliable supplement to traditional water supplies while protecting beneficial uses. Desalination is another water supply option that can be used in conjunction with other water supplies to ensure areas can meet their water demands. The proposed Desalination Amendment would establish an analytical framework for evaluating proposed desalination projects that would use seawater in order to increase availability of potable water supplies. It is up to water providers to evaluate various supply options and costs and impacts of each to make informed decisions about future supplies. Selecting water supply alternatives at a local, regional, or statewide level is not the State Water Board’s role and the State Water Board does not propose to prioritize or rank water supply options on a statewide level.” (OPA Staff Report, p. H-7.) (See Appendix NN – August 31, 2016 Whitepaper “Determining the Need
for the Huntington Beach Desalination Project on the Basis of a “Desal as the Last Resort” Approach is Contrary to the Desalination Amendment.”

Hanemann: It is likely that there are many cheaper sources of water for Orange County, including water from the reuse of treated wastewater, or water market purchases, or conservation.

Poseidon Response: The State Board expressly rejected the notion that there should be a water resource preference, or “loading order”, when determining a proposed desalination project’s compliance with the OPA. The OPA Staff Report states: “A goal of the proposed Desalination Amendment is to support the use of ocean water as a reliable supplement to traditional water supplies while protecting beneficial uses. Desalination is another water supply option that can be used in conjunction with other water supplies to ensure areas can meet their water demands. The proposed Desalination Amendment would establish an analytical framework for evaluating proposed desalination projects that would use seawater in order to increase availability of potable water supplies. It is up to water providers to evaluate various supply options and costs and impacts of each to make informed decisions about future supplies. Selecting water supply alternatives at a local, regional, or statewide level is not the State Water Board’s role and the State Water Board does not propose to prioritize or rank water supply options on a statewide level.” (OPA Staff Report, p. H-7.) (See Appendix NN – August 31, 2016 Whitepaper “Determining the Need for the Huntington Beach Desalination Project on the Basis of a “Desal as the Last Resort” Approach is Contrary to the Desalination Amendment.”)

Hanemann: I understand that Irvine Ranch Water District (IRWD) has purchased farmland in Palo Verde Irrigation District (PVID) possibly with the purpose of transferring the water directly or indirectly into Orange County. I understand that this water was acquired for a one-time, upfront cost of approximately $3,400/AF, which will turn out to be significantly cheaper than the ultimate cost of water from Poseidon.

Poseidon Response: This statement is irrelevant to the Regional Board’s evaluation of the Project and compliance with the OPA. However, the statement is also incorrect. The water purchase agreement between Poseidon and OCWD includes a fixed price agreement. The cost of desalinated water in the first full-year of operation is projected to be significantly lower than $3,400/AF. Further, the fixed-price nature of the water purchase agreement provides OCWD and its ratepayers with greater long-term cost certainty. (See Appendix P2 – 2018 revised Water Purchase Agreement Term Sheet between OCWD and Poseidon Water)

Hanemann: With regard to the increased reuse of treated wastewater, MWD in partnership with the Los Angeles Sanitation Districts is building an 0.5mgd
demonstration plant, the Carson Project, that should start up by the end of this year. If it proves successful, the plan is to scale the program up to as much as 150 mgd.

**Poseidon Response:** The State Water Board expressly rejected the notion that there should be a water resource preference, or "loading order", when determining a proposed desalination project's compliance with the OPA. On October 18, 2017, OCWD sent a letter to the State Lands Commission in response to "incorrect statements" made by Coastkeeper’s regarding OCWD’s stated interest in the desalination project. OCWD’s letter included the following, “[Coastkeeper] indicates that if the proposed Metropolitan Water District (MWD) Carson Indirect Potable Reuse project is completed and provides OCWD with water, that the Poseidon project would not be needed. OCWD believes this statement is incorrect. At this time, it is OCWD’s understanding that if recycled water from the MWD Carson project is received by the District it would replace the 65,000-acre feet per year of untreated MWD water that is currently annually purchased by OCWD. Additionally, this comment by Orange County Coastkeeper does not account for the primary purpose of the proposed Poseidon project which is too (sic) reduce the areas need for imported water.” *(See October 18, 2017 OCWD letter to the State Lands Commission)*

**Hanemann:** The questions that should have been addressed by the ISTAP Phase 2 Report, but have not yet been answered, are these: What is the value added for Orange County by obtaining 56,000 AF every year from Poseidon at a cost of $2,200/AF? What is the economic cost to Orange County of intermittent supply shortages? What is the economic value to water users in Orange County of mitigating the risk of these shortages? Does it actually justify the scale, location, and cost of the Poseidon facility?

**Poseidon Response:** These questions go above and beyond the OPA’s requirements for establishing economic feasibility. *(see Appendix QQ and AAAA)* In addition, as described in the detailed responses to the Fryer report provided above, ample evidence in the Regional Board’s record demonstrates the key benefit of providing a local, climate-resilient water supply for Orange County.

**Hanemann:** In short, the ISTAP Phase 2 analysis fails to demonstrate that a subsurface intake is not economically viable compared to the screened open ocean intake proposed for the Poseidon facility. It also fails to demonstrate that the Poseidon facility with any type of intake is economically justified.

**Poseidon Response:** See previous responses concerning subsurface intake feasibility and Project scale.
SLANT WELL INTAKE - POTENTIAL LIFE-CYCLE COST SAVINGS

Hanemann: A striking inconsistency with the ISTAP Phase 1 Report is that the ISTAP Phase 2 analysis considered alternative scales of plant production capacity for the intake options being considered – open-ocean, SIG-Trestle, and SIG-Float In. Three alternative scales were considered in addition to the 50 mgd of production proposed by Poseidon and analyzed in ISTAP Phase 1 Report; these were production levels of 100 mgd, 25 mgd, and 15 mgd. The per unit cost of delivered water for a 25 mgd facility was estimated to be about only 7.6% to 10.1% higher than for a 50 mgd facility.

Poseidon Response: See previous responses regarding the extent of the WIT analysis as well as various reports and analysis submitted as part of the Regional Board’s application process. The WIT evaluated various slant well scales in addition to the proposed 50 MGD plant (See Appendix III and QQQQ).

Hanemann: The ISTAP Phase 1 team was unwilling to consider alternative scales besides Poseidon’s 50 mgd design. But, as also noted above, ISTAP Phase 1 rejected slant wells as a subsurface intake technologically because of uncertainty about this technology’s ability to provide “the required volume of water” – i.e., 50 mgd. The implication is that, had a smaller scale been permitted, slant wells would have been deemed an acceptable technology. Whether intentionally or not, the inconsistency in the production scale assumed by ISTAP Phase 1 and ISTAP Phase 2 had the effect of eliminating slant well as a technology to be costed and compared alongside open ocean intake.

Poseidon Response: See previous responses regarding the extent of the WIT analysis as well as various reports and analysis submitted as part of the Regional Board’s application process. The WIT evaluated various slant well scales in addition to the proposed 50 MGD plant (See Appendix III and QQQQ).

Hanemann: The other reason why the ISTAP Phase 1 Team rejected slant wells as a subsurface intake technology relied on a consideration that the SWRCB explicitly rejected – namely the mere existence of some impact on freshwater aquifers. Together, the reasons why ISTAP Phases 1 and 2 rejected the alternative of a slant well intake lack credibility.

Poseidon Response: See previous responses. This statement is incorrect. The State Board did not explicitly reject impacts hydrodynamic impacts to freshwater aquifers as a basis for an infeasibility finding.

Hanemann: There are reasons to believe that slant wells are a cheaper technology than the subsurface intake gallery considered by ISTAP Phase 2 and, quite possibly,
a cheaper technology than the ocean intake proposed by Poseidon. First, information summarized in California Coastkeeper Alliance Appendix 3 Cost of Slant Wells, suggests that the construction cost for slant wells might be as much as an order of magnitude lower than the cost of the subsurface infiltration gallery considered by ISTAP 2. Second, as the Abt Associates economic analysis commissioned by the SWRCB suggests, there could be significant cost savings for slant wells because they would not need the full conventional pretreatment that is required for the open ocean intake proposed by Poseidon.

Poseidon Response: See previous responses concerning subsurface intake infeasibility and cost.

Hanemann: The ISTAP 2 Report did not consider the cost savings of subsurface intakes when the need for conventional pretreatment is reduced or eliminated, a surprising omission.

Poseidon Response: This statement is incorrect. Costs with and without conventional pretreatment were evaluated in the ISTAP Phase 2 report. (see Appendix G and AAAA).

CONCLUSION

Hanemann: As an economist with extensive experience in the analysis of water projects and water policy, including having served as the SWRCB’s economic staff, I do not believe that the analysis contained in the ISTAP Phase 1 and Phase 2 Reports meets the standards laid down by the SWRCB to determine that a subsurface intake at the Huntington Beach desalination facility is technically or economically infeasible.

Poseidon Response: See previous responses. We disagree with this contention and do not believe the author is fully aware of the analysis conducted by the WIT and additional analysis provided to the Regional Board through the application process (See Appendix III and QQQQ). Furthermore, Poseidon is not relying solely on the ISTAP to support the conclusion that subsurface intakes are infeasible. Subsurface intakes independently have been deemed infeasible by the City of Huntington Beach (2005 and 2010), State Lands Commission (2010 and 2017) and Regional Board (2012) (See Appendix C, D and J).

Hanemann: The 50 mgd scale of the facility has not been justified as required by the 2015 Ocean Plan Amendment.
Poseidon Response: We disagree. See previous responses concerning Project scale and need, including the detailed responses to the Fryer report provided above. (See Appendices N, O, P, P2, EE, FF, GG, LL1, LL2, MM and WW).

Hanemann: The assertion that it is a “fatal flaw” for a slant well intake because it would draw some volume of groundwater does not comport with the assessment criteria specified in the 2015 Ocean Plan Amendment and, by itself, is not a valid reason to reject a slant well intake.

Poseidon Response: See previous responses concerning subsurface intake infeasibility, including the detailed responses to the HydroFocus report provided above.

Hanemann: The second reason adduced by the ISTAP Phase 1 Report to reject the option of a slant well intake – that it is not a well-established technology – is unpersuasive, given that slant well intakes are incorporated in both the CalAm-Monterey and Doheny desalination project proposals.

Poseidon Response: See previous responses concerning subsurface intake infeasibility.

Hanemann: The finding by the ISTAP Phase 2 Report that a subsurface intake at Huntington Beach would not be economically viable lacks foundation. The quantity offered as a measure of the economic value of the increased reliability provided by desalination – the time-varying that OCWD is willing to pay to Poseidon – is flawed and does not in any way measure the (likely increasing) economic value of supply reliability in Orange County.

Poseidon Response: See previous responses concerning subsurface intake infeasibility and costs.

Hanemann: There are reasons to believe that slant wells are a cheaper technology than the subsurface intake gallery considered by ISTAP 2 and, quite possibly, a cheaper technology than the ocean intake proposed by Poseidon. This option needs to receive a proper consideration.

Poseidon Response: See previous responses concerning subsurface intake infeasibility and costs.

Hanemann: If the ISTAP analyses were to be corrected, several questions need to be addressed more transparently:

(1) How is the water from the Huntington Beach desalination facility to be used, and
priced? Will it be held in reserve primarily for use at times of shortage, and will it be priced specially on those occasions so as to capture the higher value of an increment in water supply during a shortage? Or will it serve mainly as additional baseload supply, and will it be priced no differently than other water sold for baseload supply?

**Poseidon Response:** This analysis goes above and beyond the OPA requirements. In addition, please see the detailed responses to the Fryer report, provided above, that discuss OCWD’s identified need for the Project’s water.

(2) Who will contract with Poseidon? It is not obvious to me that OCWD is the party best placed to be the buyer of this water since it is a groundwater management agency. To maximize the economic value of water obtained by desalination, namely as insurance against disruption of regular surface water supplies, you would want to connect it to as extensive a surface water distribution network as possible. Groundwater injection seems like a sub-optimal solution. Perhaps MWD would be a better fit as the party that contracts with Poseidon and would be better placed to maximize the economic value of this water.

**Poseidon Response:** This analysis goes above and beyond the OPA requirements. In addition, please see the detailed responses to the Fryer report, provided above, that discuss OCWD’s identified need for the Project’s water.

(3) What should the scale be? Alternatives smaller than 50 mgd should be considered. It could be that a smaller scale desalination plant would have greater economic value as substitute source of water when the conventional surface water sources of supply are disrupted.

**Poseidon Response:** See previous responses concerning Project scale. A smaller scale plant will increase the unit cost of water.

(4) There is also the question of timing. Why build now – or rather, why build 50 mgd now? Desalination is a relatively modular source of supply. It may not be optimal to invest now to build out the full desalination supply that will be needed in, say, 2060.

**Poseidon Response:** See previous responses concerning Project need, including the detailed responses to the Fryer report, provided above.