

The Phase 2 ISTAP Report Meets and Exceeds the Desal Amendment Requirements

Response to questions about Independent Scientific Technical Advisory Panel (ISTAP) Phase 2 Report related to Economic Analysis for the Huntington Beach Desalination Project

As part of the consultation process between the State and Regional Water Board staffs and the Coastal Commission staff, Poseidon has provided additional information necessary for a Water Code 13142.5(b) determination. On July 14, 2016, representatives from the Regional Water Board, State Water Board, and California Coastal Commission met with Poseidon to provide an update on the formal consultation process and to provide initial feedback on Poseidon's submittals to date. During the meeting, State and Regional Water Board staff explained that certain information and data gaps may exist and need to be filled before Regional Water Board staff will have sufficient information to make recommendations to the Regional Water Board regarding compliance with the Desalination Amendment and a new Water Code section 13142.5(b) determination. During the July 14th meeting a question was raised that the ISTAP's use of "willingness to pay" analysis may not meet the Desal Amendments requirements and that this had been brought into question by the public. At that meeting Poseidon questioned the need for an "independent review of an independent analysis" but committed to provide additional information related to these questions.

On July 29, 2016, Regional Board staff sent Poseidon a letter identifying additional information that may potentially be required including a "neutral third party analysis of certain portions of the Independent Scientific Technical Advisory Panel (ISTAP) Phase 2 Report related to economic analysis. (Ocean Plan, Chapter III.M.2.a)."

A closer review of the ISTAP Phase 2 report confirms that the SIG economic infeasibility determination does meet the requirements of the Desalination Policy 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 Desalination Amendment's definition of feasible.

QUESTIONS REGARDING CERTAIN PORTIONS OF THE INDEPENDENT SCIENTIFIC TECHNICAL ADVISORY PANEL (ISTAP) PHASE 2 REPORT RELATED TO ECONOMIC ANALYSIS

QUESTIONS/COMMENTS:

1. A question was raised that the “willingness to pay” analysis may not meet the Desal Amendments requirements.
2. The ISTAP’s SIG Economic infeasibility determination had been brought into question by the public.
3. Water Board staffs were not part of the ISTAP process.

RESPONSE:

1. A question was raised that the “willingness to pay” analysis may not meet the Desal Amendments requirements.

The economic analysis documented in the Phase 2 ISTAP Report, including the use of life cycle costs and the methodology of willingness to pay, does meet the Desal Amendment requirements and even went beyond those requirements by employing a sensitivity analysis which encompassed 96 different scenarios thus providing a comprehensive assessment of the relative impact of the various factors on the life cycle costs, which provides the basis for assessing the economic viability and thus, economic feasibility of the SIG.

The Phase 2 ISTAP considered and incorporated the definition of economic feasibility regarding subsurface intakes as adopted in the May 6, 2015 amendment to the Ocean Plan, that stated, **“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.”** (Phase 2 Report: Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California, pages 8 and 23)

The ISTAP followed the Desal Amendment requirements for determining project life cycle cost. The primary focus of the Phase 2 ISTAP was assessing the feasibility of the SIG within the context of the proposed location for such an intake structure. However, for purposes of assessing the economic feasibility of the SIG in accordance with the Desal Amendment requirements, it was necessary to assess the overall project cost for both intake options (screened open ocean or SIG), which included estimated costs for all four of the main components of the project, not just the cost of the SIG. These costs included comprehensive estimates for each intake design alternative including the costs associated with constructing and operating the alternative intake options, as well as the desalination facility itself. It included costs associated with decommissioning the desalination facility at the end of its expected life. For the open ocean intake alternative, costs included estimates for 1.0 mm (0.04 in) screens. The cost estimates for the open ocean intake also included costs associated with environmental mitigation that Coastal

Commission staff has indicated it will require Poseidon to implement to further offset entrainment impacts.

This life cycle cost approach was consistent with the Desal Amendment requirements: *M.2.d (1) (a) -Subject to chapter M.2.a.(2), the regional water board in consultation with State Water Board staff shall require subsurface intakes* unless it determines that subsurface intakes* are not feasible* based upon a comparative analysis of the factors listed below for surface and subsurface intakes. * M.2.d 91)(a) i -The regional water board shall consider the following factors in determining feasibility of subsurface intakes... project life cycle cost. Project life cycle cost shall be determined by evaluating the total cost of planning, design, land acquisition, construction, operations, maintenance, mitigation, equipment replacement and disposal over the lifetime of the facility, in addition to the cost of decommissioning the facility.*

The importance of looking at life cycle cost versus a comparison of project costs was clear from the Panel's work: **"The capital costs in 2015 dollars for the Ocean Open Intake range from a low of \$852 million to a high of \$899 million. O&M costs for this option range from \$49 to \$54 million per year. The capital costs in 2015 dollars for the SIG range from a low of \$1,936 million to a high of \$2,347 million. O&M costs are the same for each SIG option and range from \$42 to \$58 million per year. Annual O&M costs for the SIG options are \$4 to \$7 million less than O&M costs for the open ocean intake option or a modest reduction of approximately 7 to 15%."** (Phase 2 Report, page 14)

To provide a more direct comparison of project costs over time, the Panel developed unit costs that reflected the cost of water per acre-foot of production. To develop these estimates, they divided the total life cycle present value costs over time by the amount of water that the desalination facility will produce over time (in present value terms). The unit costs provided a quick way to examine the key variables that affect total costs, including discount rates, project life, and construction period. The life cycle cost analysis performed by the Panel included sensitivity analysis of project life, discount rate and four project scales. The sensitivity analysis encompassed 96 different scenarios thus providing a comprehensive assessment of the relative impact of the various factors on the life cycle costs, which provides the basis for assessing the economic viability and thus, economic feasibility of the SIG. They found that: **"The average unit cost for the Ocean Open Intake is estimated to be \$1914/AF, compared to average cost for the two SIG options of approximately \$3,461/AF. The selection of a SIG intake technology, regardless of the construction method, increases the estimated unit cost for the 50 MGD product capacity by nearly 80%."** (Phase 2 Report, page 15).

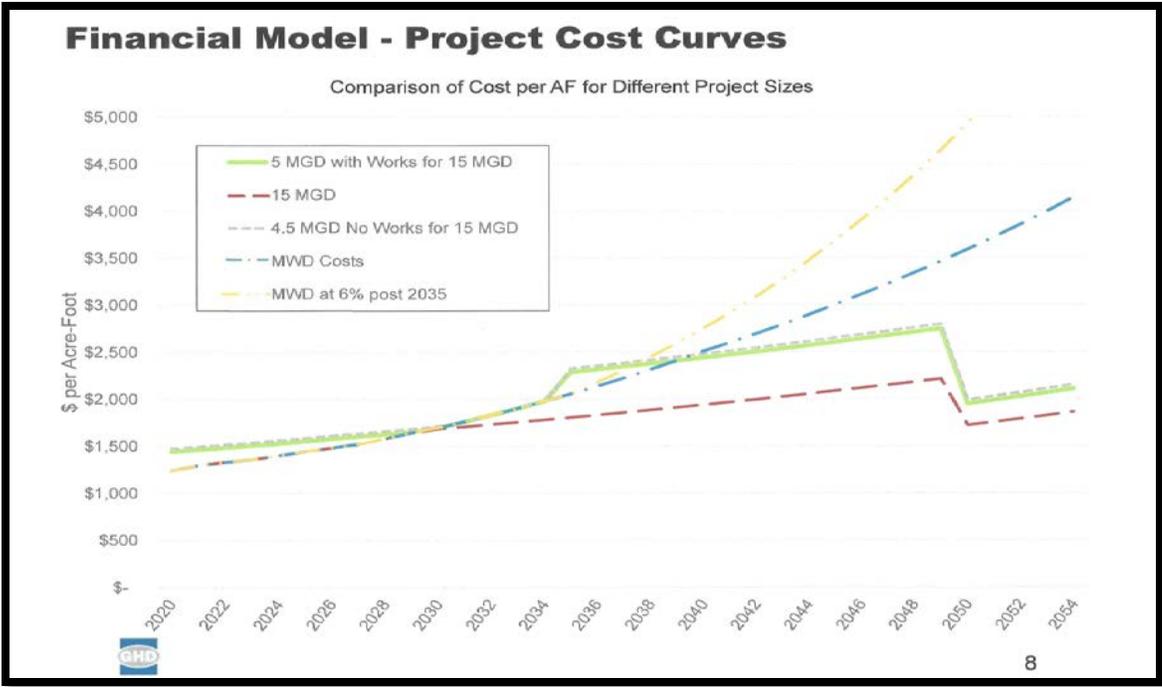
When the Panel determined the magnitude of this differential life cycle cost they searched for some way to identify the value or benefit that could be assigned to the additional cost of the SIG alternative so that there would be some type of economic balancing to see if there was something that would explain the apparent gross cost disparity between the intake alternatives. They identified a lack of a clear argument about avoiding entrainment impacts. Panelists identified that it was hard to come up with an economic justification for a SIG unless there was a much stronger statement about the environmental benefits. Commission staff responded that this subject was not within the scope of the Panel's assignment.

Panelists noted that a determination of economic feasibility is not based solely on a comparison of two options, but rather on willingness of purchasers to pay for the water, financiers expectations on earning a return on their capital and the period of time before the SIG plant would be economic. Panelists discussed several elements of economic feasibility, including: (1) willingness of the Orange County Municipal Water District (OCMWD) to purchase the water; (2) willingness of investors (bondholders, equity partners, etc.) to back the project, and; (3) willingness of Poseidon to produce the water. Item (1) is based on several elements, including cost per acre-foot, reliability of water, reduced reliance on imports and risk. Item (2) is based on the rate of return and risk. Item (3) is based on Items (1) and (2).

The ISTAP decided to employ a willingness to pay methodology using the Orange County Water District's (OCWD) Water Purchase Agreement Term Sheet as a starting point. They based the OCWD water price on the amount that OCWD will likely have to pay for water supplied by the Metropolitan Water District (MWD) of Southern California in the future because OCWD would rely on MWD water if the desalination facility is not constructed.

On May 14, 2015 the OCWD board of directors had voted to approve a Water Reliability Agreement Term Sheet for the purchase of 50 million gallons per day (56,000 acre feet per year) of drinking water from the proposed Huntington Beach project. This structure represented the District's willingness to pay after months of discussions with the District's constituents and negotiations with Poseidon. OCWD was prepared to pay Poseidon the avoided cost it would otherwise pay for imported water sold by the Metropolitan Water District of Southern California, plus a water reliability premium that starts at up to 20% and steps down to zero over the term of the contract. The 50-year average would be no more than 10% above MWD and price re-openers in the term sheet could result in the District paying less than the avoided MWD rate over the life of the agreement. For example, in 2015 the District would be willing to pay Poseidon no more than approximately \$1,675 per acre foot for the production of the desalinated water (This assumes the MWD Local Resources Program subsidy of \$475 per acre foot is received so that OCWD net cost is \$1,200 per acre foot).

This approach of analyzing potential water supplies options by comparing the unit cost of each alternative is not unusual. In southern California, the cost of MWD's imported water is often used as the alternative water supply source to compare a potential regional or local water supply options. For example, as shown in the chart below, the South Coast Water District is analyzing different scales for their Doheny Desal Project and in doing they compare the projected unit cost of the alternatives against the projected MWD cost with the subsidies MWD provides for development of local water supplies.



Doheny Desalination Project Delivery Method
 South Coast Water District Board of Directors Workshop #3, July 27, 2016

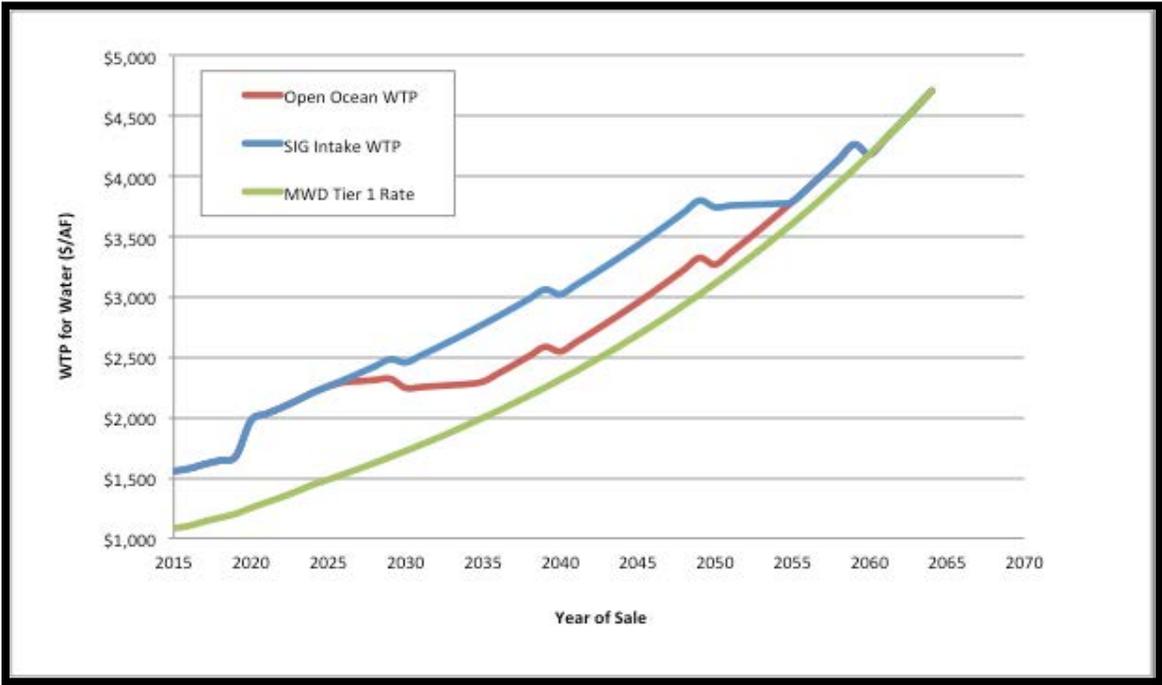


Figure 5.1 Forecast Price that Orange County Water District Would Pay for Water from a Huntington Beach Desalination Facility (*Phase 2 Report: page 60*).

The ISTAP also used the projected price of MWD water and on top of this price, they factored in a subsidy that MWD provides local communities for developing local water supplies, as well as a premium that OCWD has indicated it is willing to pay for the increased water supply reliability that the desalination plant will provide relative to MWD supplies. Absent the term sheet, the analysis likely would have been similar to the approach used by South Coast Water District as shown above. In the case of OCWD, the premium raised the amount they could pay over the MWD rate less the MWD subsidy. This approach evaluated the likelihood that project revenues will cover project costs over the life of the project and goes beyond just a comparison of the relative expense of subsurface intakes to a determination of whether the desalination facility would be economically viable as required by the Desal Amendment.

In addition, the Phase 2 ISTAP considered the time factor in assessing “feasibility”, recognizing that completing the project within a “reasonable” time frame (*Coastal Act and CEQA definition; “Feasible” means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, and environmental, social, and technological factors.*) must also be given appropriate weight. ISTAP Phase 2 determined that: **“In this context, economic feasibility relies in large part on the likelihood that anticipated plant revenues will cover the project costs within a reasonable time frame. Thus, our principal consideration for determining economic feasibility is the likelihood in any given year that OCWD will be willing to pay Poseidon’s costs to construct and operate the desalination facility.”** (Phase 2 Report, page 61)

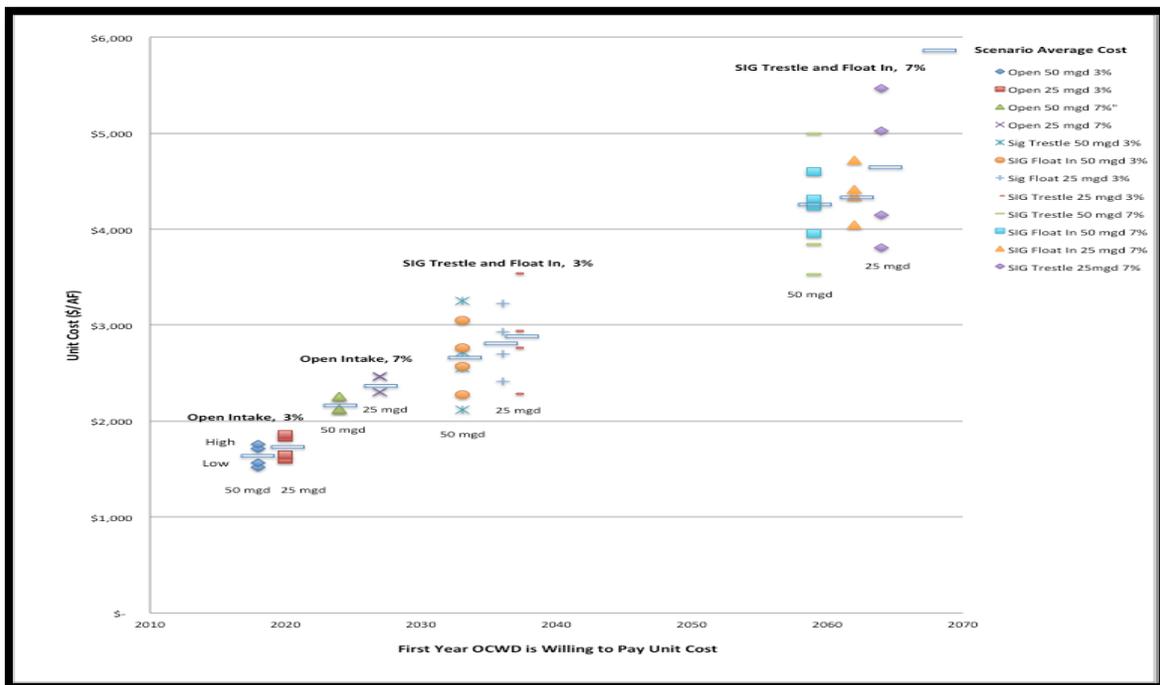


Figure 5.2 The Unit Cost to Produce Water and First Year of Project Feasibility (*Phase 2 Report: pages 18 and 62*).

Using the information summarized in the Figure above, the Phase 2 ISTAP concluded that: **“The SIG 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 compared to the open ocean intake option.”** (Phase 2 Report, pages 18 and 66)

“The economic viability of the SIG, regardless of construction technique, and for a product capacity of 50 MGD at this off shore location, is highly uncertain and thus the SIG option faces financing risks that pose significant barriers to implementation. We believe that it is unlikely that the unit price for produced water from a SWRO plant with the SIG intake technology would find a buyer under current and likely future estimates of alternative waters sources through 2033. The very high capital cost adds operating cost in the form of additional interest that overwhelms the savings in pretreatment operating costs provided by the SIG intake”. (Phase 2 Report, pages 18 and 66)

Cost and price were not the only criteria that needed to be considered in making a judgment about the feasibility of the different intake options. Other criteria include several factors that are difficult to monetize, but that will likely weigh heavily in agency permitting and in Poseidon’s decision making. These other factors identified by the Panel included construction risks or challenges, which may occur since the SIG options have not been constructed at this scale, and a range of environmental and social concerns.

2. The ISTAP’s SIG economic infeasibility determination had been brought into question by the public.

The ISTAP reviewed and considered public comments on the draft Phase 2 Report and modified the final report as they thought appropriate. They did not change their economic analysis or their findings and conclusions.

The ISTAP produced a draft Phase 2 Report and invited public comment. Both the State and Regional Water Boards, along with the other identified stakeholders, had the opportunity to provide comments. In reviewing the comments that questioned the economic analysis, and comments that suggested alternative methods of analysis, the Panel discussed in detail a few significant questions and made what they determined to be appropriate changes in the final report.

Why had they not analyzed different sites?

The Panel discussion was that the Phase 1 ISTAP Report had ruled out wells at the project scale at the site, but found that the SIG location near the site was optimal. Evaluation of the SIG alternative at this site would provide the best case for that alternative compared to other locations that would not have had similar characteristics of being in a “no change zone” in the offshore area. Furthermore, the Panel was required by the Terms of Agreement to just look at the project site.

Why had they not analyzed different scales?

The answer was clear in this case as the Phase 2 Report included analysis of four scales of 12.5, 25, 50, and 100 mgd. The report includes **“Finding 4: Reducing the product scale of the desalination facility decreases capital and O&M costs, but the unit cost increases as the scale (or product capacity) decreases from 50 MGD to 12.5 MGD. Alternatively, increasing the product capacity to 100 MGD results in a net decrease in unit cost.”** (Phase 2 Report, page 15)

Why had they not used some kind of cost benefit analysis or other methodology?

There were some comments that related to the use of alternative feasibility analysis techniques. These comments stated that the Panel should have looked at cost-benefit analysis, reliability premiums, marginal cost of reliability, end customers willing to pay, melded rate impacts, comparative costs and benefits of other water sources, public costs and lost opportunity costs.

This question was discussed at length as the Panel noted that they could not determine the value of the benefit. They needed a value for the SIG’s perceived entrainment minimization benefits to do a benefit to cost analysis. That value was not found in any of the information provided to them and they had not found anything in the literature that quantified the benefits provided by using a SIG intake instead of a screened open intake.

Throughout the Phase 2 process Commission staff told the ISTAP members that they were not being asked to question whether entrainment is an adverse effect and that the report should not compare the potential environmental impacts of the proposed intake technologies because such a comparison was not within the scope of the Panel’s work. As a result, the Panel membership, by design, did not include any marine biologists or ocean economists at the insistence of the Commission staff.

The Panel determined that the issue at the end of the day was whether the project would go forward. They could have just compared the costs and made some judgement on whether the SIG cost was too high. Instead they decided to use the willingness to pay approach which was harder but provided better information to inform the economic analysis. This analysis required additional work for the economists on the panel.

The Phase 2 Panel considered all of the comments and added some clarifications to the final report including:

- **“It should also be noted that the Panel’s charge was to analyze the cost effectiveness of alternative intake designs at the proposed desalinization facility in Huntington Beach”** (Phase 2 Report, page 14)
- **“We did not evaluate the cost effectiveness of other water supply options in the region including recycling, conservation, water transfers or groundwater recharge. Similarly, we did not evaluate the social value of fish larvae at risk from the proposed facility. The Panel determined that these and other possible study objectives were outside the scope of work designated in the Terms of Reference (Appendix B). The Conveners agreed with this determination”.** (Phase 2 Report: pages 14 and 63)

- **“The Panel recognizes that future desalination projects may refer to the Findings and Conclusions in this Report, which are specific to the project conditions described. The methodology used by the ISTAP may have utility in assessing the feasibility of alternative intake technologies for other desalination projects. However, consistent with the Terms of Reference and the assumptions presented in this Report, the Panel cautions that these conclusions apply only to the proposed Huntington Beach project, and specifically only to the proposed SIG site and technologies that are described and evaluated in the Report. These conclusions should therefore not be projected to other desalination projects or sites to compare or assess their feasibility”.** (Phase 2 Report, pages 19 and 67)

The Panel did not change their methodology used in the economic analysis.

3. *Water Board staffs were not part of the ISTAP process*

While the Water Board staffs were not formal conveners of the ISTAP, there were opportunities for their participation as identified stakeholders. They did not make any comments on the two ISTAP reports. They did not provide any questions relating to the Phase 2 Panel’s economic analysis approach or the report’s references to the Desal Amendment. At no time during the ISTAP process was there feedback from the Water Board staffs that the ISTAP’s economic feasibility evaluation was not consistent with the guidance in the Desal Amendment.

Furthermore, the conveners of the ISTAP process, the Coastal Commission staff and Poseidon, were participants in the Desal Amendment process and provided the link between the two processes. The work being done in parallel to the ISTAP process by the State Water Board in developing an amendment to the Ocean Plan addressing issues associated with desalination facilities, was identified and recognized by the ISTAP conveners from the start. Briefings on the progress and outputs of the State Water Board process were provided to the Panel. The Water Board staffs, at both the State and Regional level, were notified of ISTAP meetings and were provided opportunities to comment on draft reports. While the conveners attempted to ensure the ISTAP review was consistent with relevant requirements within the limited extent of the review being conducted, the Report was not intended to be a full analysis of conformity or non-conformity with the Desal Amendment.

The issue of coordinating the ISTAP process was discussed at a July 27th work session of the Panel. Commission staff explained that there was not a great deal of difference between the Desal Amendment and the ISTAP process and that they envisioned that the Water Board would go through a similar decision process. The Panel concluded that it did not change the Panel’s work which was to review subsurface intake options.

Response to Public Comments Received by August 19, 2014 by the State Water Board Staff in the Desal Amendment process referenced the ongoing ISTAP process as it related to the Desal Amendments: “...the State Water Board is aware that the issue of technical and economic feasibility is currently being evaluated by an Independent Scientific Technical Advisory Panel (ISTAP) convened and facilitated by CONCUR, Inc. under the auspices of the California

Coastal Commission and Poseidon Resources (Surfside) LLC. The ISTAP released the “Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California” on October 9, 2014. This report evaluated technical feasibility of 9 different subsurface intake designs and determined that two alternatives were technically feasible. The Phase 2 analysis that will take a broader look at overall feasibility of subsurface intakes, including costs, lifecycle costs, and broader environmental impacts is currently underway. Should the ISTAP determine that subsurface intakes are not feasible, the proposed Desalination Amendment provides a mechanism whereby surface intakes may be permitted. In order to clarify that analysis of feasibility for subsurface intakes must include consideration of costs, the draft Desalination Amendment has been amended in to include a definition of “feasible” to be consistent with that set forth in CEQA: “. . . capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors.” (Please also see response to comment 6.12) Any future determination as to best available site, design, technology and mitigation measures feasible for any facility will consider the criteria provided in the Desalination Amendment with these considerations in mind.” (March 20, 2015 Draft Final Staff Report with Draft Final SED: Appendix H).

ISTAP concluded that the definition of “technical feasibility” should be informed by the recent State Water Resources Control Board Draft Desalination Policy. The ISTAP also concluded that six of 14 factors specified by the Draft Policy should be considered to determine subsurface intake technical feasibility. Consideration of the other eight factors identified in the Draft Policy may be incorporated into Phase 2 of the overall Panel process to assess feasibility of those technologies deemed “Technically Feasible” in the Phase 1 assessment.

The ISTAP Phase 2 Report included an explanation that the Panel’s determination of the range of costs that inform whether or not the Sea Floor Infiltration Gallery is likely to be economically viable and applied the definition of economic feasibility included in the recent Desalination Amendment to the Ocean Plan, approved on May 6, 2015 by the SWRCB.

The ISTAP Phase 2 report was intended to be used as part of the Coastal Commission’s upcoming consideration of Poseidon’s application for a coastal development permit to determine how and whether the proposed project will be consistent with policies of the Coastal Act and of the City of Huntington Beach Local Coastal Program. The Panel was not charged with conducting a Water Code 13142.5(b) determination as identified in the Ocean Plan Amendment and reserved for the state’s Regional Water Quality Control Boards. The ISTAP Reports should not be considered an assessment of project conformity to other relevant regulatory requirements, nevertheless, the economic analysis conducted by ISTAP was performed with the intention that it would be consistent with the Desal Amendment requirements.