TOPICAL RESPONSE #16

EXPANDED RESPONSE ON BEACH WELL FEASIBILITY

As stated within the Draft EIR, a sea well (also known as "beach well") is a seawater intake technology consisting of a system of near-shore-drilled vertical wells designed to draw seawater from a subsurface source aquifer. Sea wells are generally of relatively small diameter of 24 inches or less. The depth of each well depends on the depth to the preferred seawater aquifer depth, but would not likely exceed 250 feet. Vertical sea wells are constructed of materials suitable for use in a seawater environment using a non-metallic casing (typically fiberglass reinforced pipe), well screens, and a stainless steel submersible or vertical turbine pump. The slot size of the well intake screens is selected to accommodate the grain-size of the aquifer formation. If necessary, an artificial gravel-pack filter is installed around the screen to enhance flow from fine formation material. Refer to Section 7.3.4.1 of the Draft EIR for a detailed description sea well technology.

Although sea wells represent a possible alternative to utilization of the EPS once-through cooling system for the intake of seawater, several technological and environmental constraints limit the feasibility of this option. The foremost limitation is the relatively small amount of seawater that can be taken from a subsurface source per well. Based on local hydrogeologic conditions, it is estimated that a beachwell concept would require 150 sea wells for a 50 MGD desalination plant. Spaced approximately 400 feet apart (and within 500 feet of the ocean), these 150 wells would extend up and down the coast for a length of approximately 11 miles. If the wells were clustered (as in an HDD or radial well arrangement), it may be possible to use one wellhead per three radial collector arms, reducing the number of wellheads to 50, spaced approximately 800 feet apart, traversing over seven miles of beachfront (refer to Response No. 3j and Topical Response No. 11 for additional discussion). Although the wellhead could be located east of the beach, it would likely require a subsurface vault to be constructed on the beach (similar to the concept being investigated by MWDOC), as well as a trench along the beach paralleling the ocean that connects all of the beachwell vaults.

Implementation of a sea well intake system would result in the following environmental impacts:

- Aesthetics: Construction-related impacts due to well construction on the beach, and pipeline trenching to connect the wells to the desalination plant. Each of the wells may require aboveground components, further disrupting the aesthetic environment during long-term operations.
- Air Quality: Construction of 50-150 sea wells on the beach may result in adverse short-term air quality impacts to beach users and near shore residences along the 7 to 11-mile stretch of beach.
- Land Use and Planning: The proposed sea well system may result in short-term and long-term land use impacts due to compatibility issue with surrounding uses.
- Noise: Sea well construction would likely create noise impacts to nearby sensitive receptors. 24-hour construction would be necessary for dewatering operations.
- Utilities: Operation of the sea well system would likely require an increased amount of electricity in comparison to the proposed project.

Although a sea well intake system may be feasible for a smaller-scale seawater desalination plant (e.g. Sand City Desalination Project, MWDOC/Dana Point, Long Beach), implementation

for a 50 MGD desalination plant would result in substantially increased impacts in comparison to the proposed project, and is not considered a feasible alternative to the proposed project.

3f. Refer to Topical Response No. 3 for additional discussion. The reference to non-power plant operational scenarios in Section 4 was unclear. The intention was to indicate that thermal and salinity conditions studied and modeled during times when EPS was not generating electricity, and therefore had a temperature change of zero (a worst-case condition for salinity). This statement has been corrected in Attachment A, *ERRATA*.

3g. Refer to Response No. 3c above, and to Topical Response No. 3. The footnote 3 comment with respect to beneficial effects of an OTC system is addressed in Topical Response No. 5.

The reference to Coastal Act §30231 will be added to the EIR, as reflected in Attachment A, *ERRATA*.

3h. The data utilized is the most recent publicly available data. No new data was provided or cited in the comment letter.

3i. Refer to Topical Response No. 3. The "Project", as proposed by the Water Authority, is predicated upon an operating OTC system at EPS. Similarly, the RSDP EIR and the anticipated forthcoming permit applications (following EIR certification) would rely upon this RSDP EIR for CEQA and regulatory permitting compliance. The RSDP EIR does not provide environmental analysis of RSDP operating conditions independent of EPS, or under conditions where the EPS intake volume drops below 219 MGD. The RSDP is not proposed to operate independent of EPS in the highly unlikely event that OTC intake drops below the minimum assumed 219 MGD (based on historical cooling water intake operations as described in Section 4 of the DEIR). However, as this is a regional water supply project and the Water Authority has flexibility and redundancy within its system, including extensive water storage facilities, the RSDP could be temporarily shut down in the highly unlikely event that EPS temporarily dropped its intake below 219 MGD.

3j. Please refer to Topical Response No. 16 and Response No. 20t for additional discussion regarding beach wells. Based on additional research (including review of borehole test data) conducted in response to this and other comments (refer to Topical Response No. 16 for details), it appears that the adjacent marine formations may support only limited subsurface intakes. This is due to the hydraulic conductivity of the Santiago Formation being low to moderate (the overlying marine sediment layer is too thin), requiring 150 beachwells, collector wells or horizontal directional drill (HDD) infiltration wells of 1,500 feet in length to obtain 110 MGD of sourcewater (as opposed to the 33 beachwells estimated in the RSDP DEIR). With clustered wells, spacing requirements are estimated at 800 feet between the 50 wellheads, requiring over 7 lineal miles of beach wells. Therefore, further analysis not only substantiates the feasibility concerns noted in the RSDP DEIR, but indicate that roughly four times the number of beachwells would be required, with associated increased construction cost, physical impacts, and permitting issues. As discussed further in Topical Response No. 16, consistent with the discussion in the RSDP DEIR. Subsurface intakes are not considered feasible for the RSDP, including but not limited to the following reasons:

1) Inadequate geology to support subsurface intakes at this scale;
2) Unproven technology at this scale (uncertain "scalability");

3) Extensive network of beachwells, even if clustered radial or slant wells are used (150 beachwells, collector wells or horizontal directional drill (HDD) infiltration wells of 1,500 feet in length to obtain 110 MGD of sourcewater). With clustered wells, spacing requirements are estimated at 800 feet between the 50 wellheads, requiring over 7 lineal miles of beach wells). This would result in:
   a. Extensive agency permitting due to State Parks, Coastal Commission and other agencies;
   b. Major construction activities required on over 9 lineal miles of beach, even with slant well concept being evaluated at Doheny State Beach, to construct the radial intake vault and to construct a lateral pipeline connecting the wellheads (the lateral pipeline would likely need to be located on the beach to allow construction access);
   c. Major construction activities at and near the State Beach would require approximately 9-12 months, resulting in significant disruption to beach access, recreational users, and local traffic disruption; and
   d. Significant cost in comparison to utilization of existing EPS infrastructure.

As part of this additional research, it was further substantiated that brine injection is not feasible ("deep well" subsurface disposal/injection of brine), for the following reasons:

1) Brine injection at this scale (50 MGD) has never been successfully demonstrated;
2) The underlying geology is not suitable due to low hydraulic conductivity;
3) Brine injection wells tend to clog and require frequent rehabilitation; and
4) At this scale, approximately 50 injection wells would be required based on site conditions. Since there must be separation between injection and intake wells to prevent migration of the disposed concentrate to the intake wells, utilization of brine injection wells would require increased spacing between intake wells, estimated at over 1,000 feet between the 50 clusters of three radial intake wells (nearly 10 miles of beach wells along the coast).

3k. This comment provides a summary of the Coastal Commission's comment letter. Please refer to the detailed responses above.