where Θ_{ij} is the bedrock failure shape function and K_a is an empirical constant. Consequently, recession by abrasion is a maximum at the wave breakpoint (at a depth of about 5/4 the breaking wave height, H_b) and decreases in both the seaward and shoreward directions. In contrast, the erodibility of the notching mechanism is a force-yield relation associated with the shock pressure of the bore striking the sea cliff (Bagnold, 1939; Trenhaile, 2002). The shock pressure is proportional to the runup velocity squared, which is limited by wave runup elevation. Wave pressure solutions (Havelock, 1940) give

$$f_e = K_n \Theta_{ij} \, \eta_r^2 \text{ (notching)} \tag{9}$$

where K_n is an empirical constant and the runup elevation θ_r is dependent on the tidal level θ_o and the breaking wave height by Hunt's formula,

$$\eta_r = \eta_o + \Gamma H_b \tag{10}$$

Here Γ is an empirical constant from Hunt's formula (*Hunt*, 1959).

3.1) Model Initialization, Bathymetry: Bathymetry provides a controlling influence on all of the coastal processes that affect dispersion and dilution. The bathymetry consists of two parts: 1) a stationary component in the offshore where depths are roughly invariant over time; and 2) a non-stationary component in the nearshore where depth variations do occur over time. The stationary bathymetry generally prevails at depths that exceed closure depth, which is the depth at which net on/offshore sediment transport vanishes. Closure depth is typically -12 m to -15 m MSL in the Monterey Littoral Cell, [Inman et al. 1993]. The stationary bathymetry was derived from the National Geophysical Data Center GEODAS digital database. Gridding is by latitude and longitude with a 3 x 3 arc second grid cell resolution in a 1201 X 1201 farfield grid yielding an xy-computational domain of 108.09 km x 86.5 km. The farfield grid mesh is indicated by the black lines in Figure 1.2. A nearfield grid was constructed with a 1 x 1 arc second grid cell resolution in a 601 X 601 numerical array yielding an xy-computational domain of 15.45 km x 18.57 km. The farfield grid (Figure 11) computes the effects of regional scale refraction and circulation due to the shallow banks of the continental margin. The nearfield grid is nested inside the farfield grid and is used to calculate the brine discharge and storm water dispersion in the vicinity of the intake.

For the non-stationary bathymetry data inshore of closure depth (less than -15 m MSL) nearshore and beach surveys were conducted by the US Army Corps of Engineers in 1985, 1990, and 1996, and GIS formatted by USGS (2006, 2007. These nearshore beach surveys were used to update the GEODAS database for contemporary nearshore and shoreline changes.

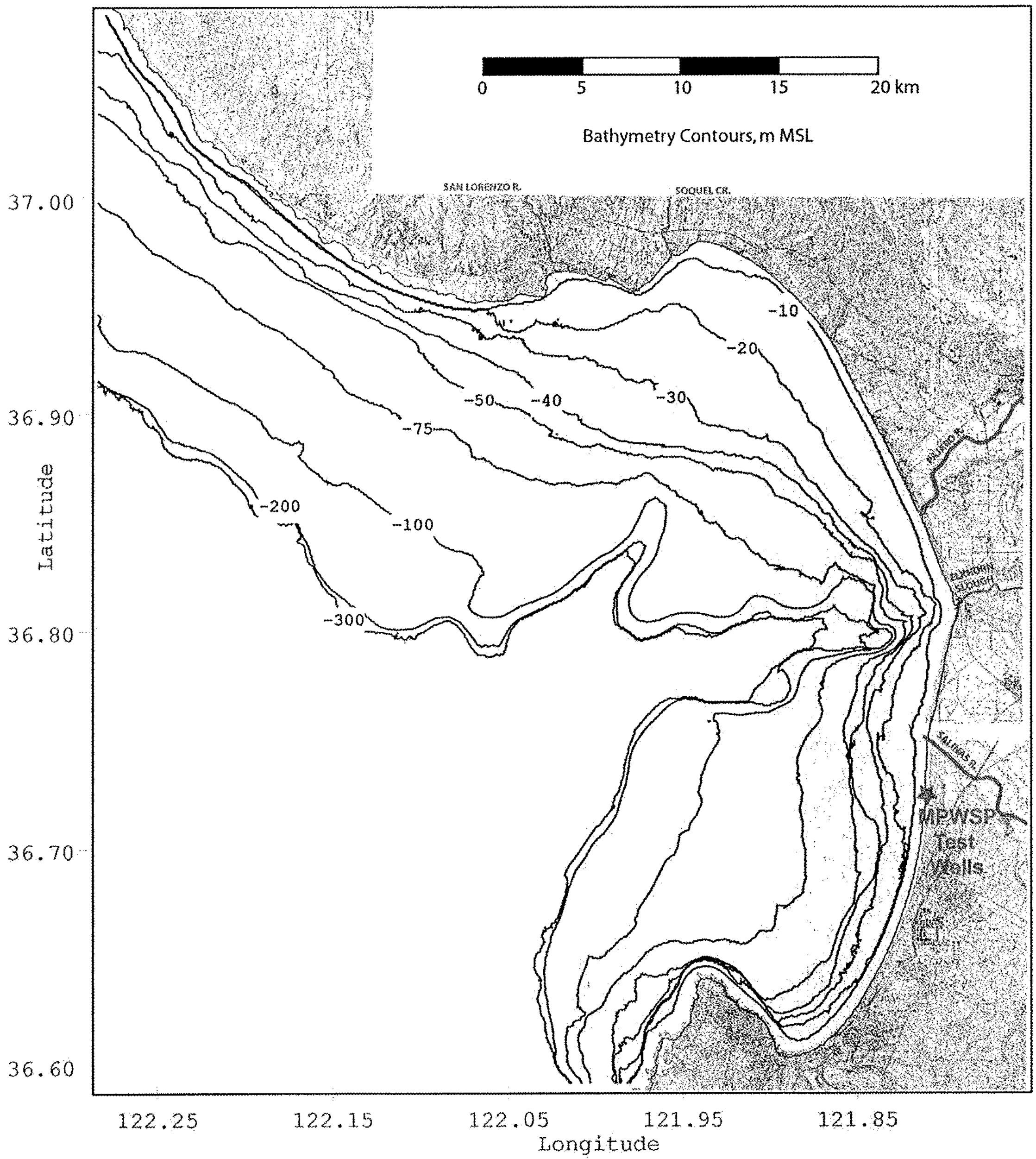

Figure 11: Farfield bathymetry for MPWSP shoreline change and littoral drift simulations. Depth contours in meters, MSL. (data from GEODAS, 2008).

3.2) Model Initialization, Wave Forcing: The availability of wave data in the Monterey Bay and Central California region limited the period of record for this long term model analysis to 1983-2008. Waves have been routinely monitored at several local and regional locations by the Coastal Data Information Program, (CDIP, 2008). These data are supplemented by ocean observations with Datawell buoys by the National Data Buoy Center (NDBC). The nearest CDIP and NDBC directional wave monitoring sites are:

a) CDIP, Harvest, California

Station ID: 071
Location: 34.455666 N; -120.783333 W
Water Depth: 549 m

b) CDIP, Point Reyes, California

Station ID: 029
Location: 37 56.76 N; -123 28.20 W
Water Depth: 301 m

c) CDIP, Coquille River Inner, Oregon

Station ID: 037
Location: 43.113335 N; -124.513336 W
Water Depth: 64 m

d) National Data Buoy Center, Monterey, CA

Station 46042
Location: 36.75 N; -122.42 W
Site elevation: sea level
Water depth: 2115 m

Air temp height: 4 m above site elevation
Anemometer height: 5 m above site elevation
Barometer elevation: sea level
Sea temp depth: 0.6 m below site elevation

These data sets possessed gaps at various times due to system failure and a variety of start ups and shut downs due to program funding and maintenance. The undivided data sets were pieced together into a continuous record from 1983-2008 and entered into a structured preliminary data file. The data in the preliminary file represent partially shoaled wave data specific to the local bathymetry around each monitoring site. To correct these data to the nearshore of the MPWSP test well site, they are entered into a refraction/diffraction numerical code, back-refracted out into deep water to correct for local refraction and island sheltering, and subsequently forward refracted into the immediate vicinity of the MPWSP test well site, as plotted in Figure 12 for the 1984-2008 period of recored.. Thus wave data off each CDIP monitoring site was used to hindcast the waves at the MPWSP test well site coastal region. The data in Figure 12a are values used as the deep water boundary conditions on the Monterey Bay bathymetry grid (Figure 11) for the forward refraction computations into the MPWSP test well site. The deep water wave angles in Figure 12c are plotted with respect to the direction (relative to true north) from which the waves are propagating at the deep water boundary of the bathymetry grid (Figure 11). Inspection of Figure 12a reveals that a number of large swells of 6 m to 7.4 m heights have affected the Monterey Bay region nearly every year during the period of record. Waves of this size create powerful wave induced currents and vigorous longshore transport and mixing in equation (1). The largest local swells computed from our analysis of the period of record resulted from the storm of 5 December 2007, for which the significant wave height was H_{max} = 7.4 m and the period was T_{max} =16 sec. The average significant wave height in the 1984-2008 period of record was $\overline{H}$ = 2.1 m (Figure 12b), the average wave period was $\overline{T}$ = 11.3 sec (Figure 12c), while the average direction of the waves in Figure 18c was $\overline{\alpha}$ = 286 degrees true.

The backward and forward refractions of CDIP data to correct it to the MPWSP test well site were done using the numerical refraction-diffraction computer code, OCEANRDS, a modification to the well-known REF/DIFF codes, (Dalrymple, et al. (1984). A listing of the codes of OCEANRDS appear in Jenkins and Wasyl (2005). These codes calculate the simultaneous refraction and diffraction patterns propagating over a Cartesian depth grid. OCEANRDS uses the parabolic equation method (PEM), Radder (1979), applied to the mild-slope equation, Berkhoff (1972). To account for very wide-angle refraction and diffraction relative to the principle wave direction, OCEANRDS also incorporates the high order PEM Pade approximate corrections modified from those developed by Kirby (1986a-c). The Pade approximates in "OCEANRDS" are written in tesseral harmonics, per Jenkins and Inman (1985); in some instances improving resolution of diffraction patterns associated with steep, highly variable bathymetry such as found near the Monterey Submarine Canyon. These refinements allow calculation of the evolution and propagation of directional modes from a single incident wave direction; which is a distinct advantage over the more conventional directionally integrated ray methods which are prone to caustics (crossing wave rays) and other singularities in the solution domain where bathymetry varies rapidly over several wavelengths.

An example of a reconstruction of the shoaling wave field throughout the Monterey continental margin region is shown in Figure 13 using the back refraction calculation of the CDIP data from the NDBC buoy #46042. Wave heights are contoured in meters according to the color bar scale and represent 6 hour averages, not an instantaneous snapshot of the sea surface elevation. Note how the shelf bathymetry induced longshore variations in wave height throughout the Monterey Bay region. Refraction patterns of the type shown in Figure 13 were generated for each of the 8,149 deep water wave events in Figure 12 between 1984 and 2008. The resulting arrays of local wave heights, periods and directions were throughput to the LCM for continuous dilution modeling. The average shoaled wave heights were 2.1 m. The maximum shoaling wave heights was 7.4 m in 2007 used in the worst-case erosion modeling. The

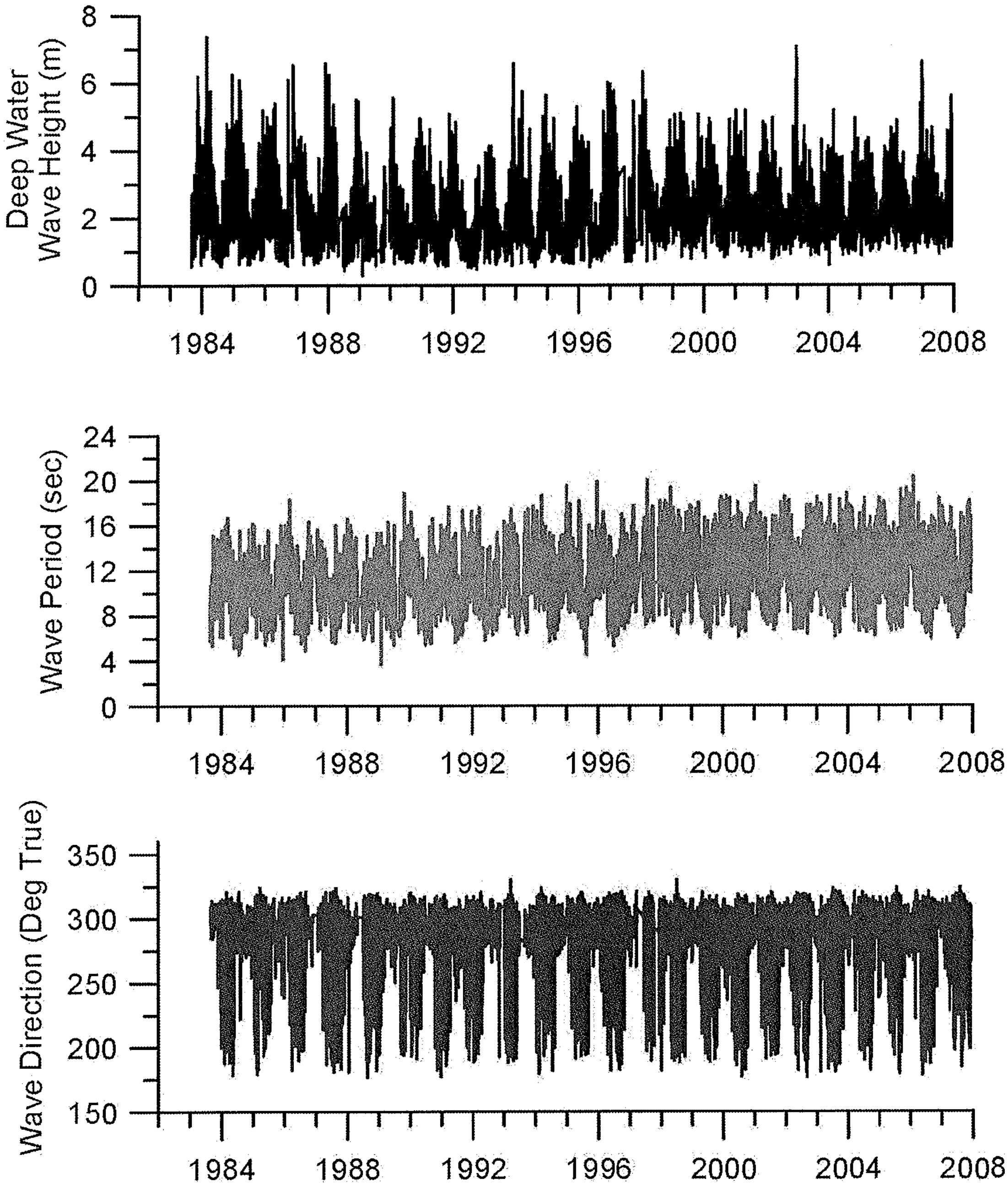

Figure 12a: Wave data reconstructed from farfield refraction/diffraction analysis of CDIP measurements. This data used as deep water boundary conditions on nearfield simulations of beach profile evolution at the MPWSP test well locations on the CEMEX property.

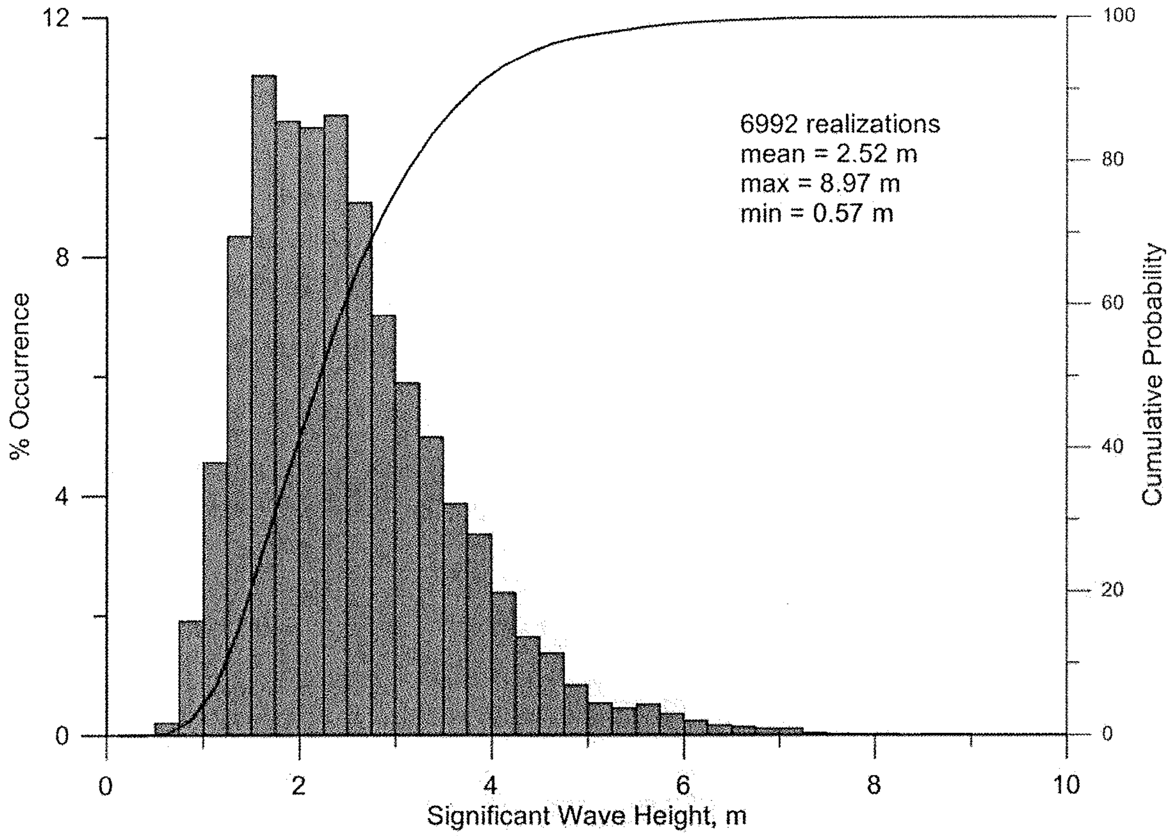

Figure 12b: Probability density (red) and cumulative probability (blue) of wave height data reconstructed from farfield refraction/diffraction analysis of CDIP measurements (cf. Figure 12a). This data used to estimate probability of occurrence of wave run-up heights at the MPWSP test well locations on the CEMEX property.

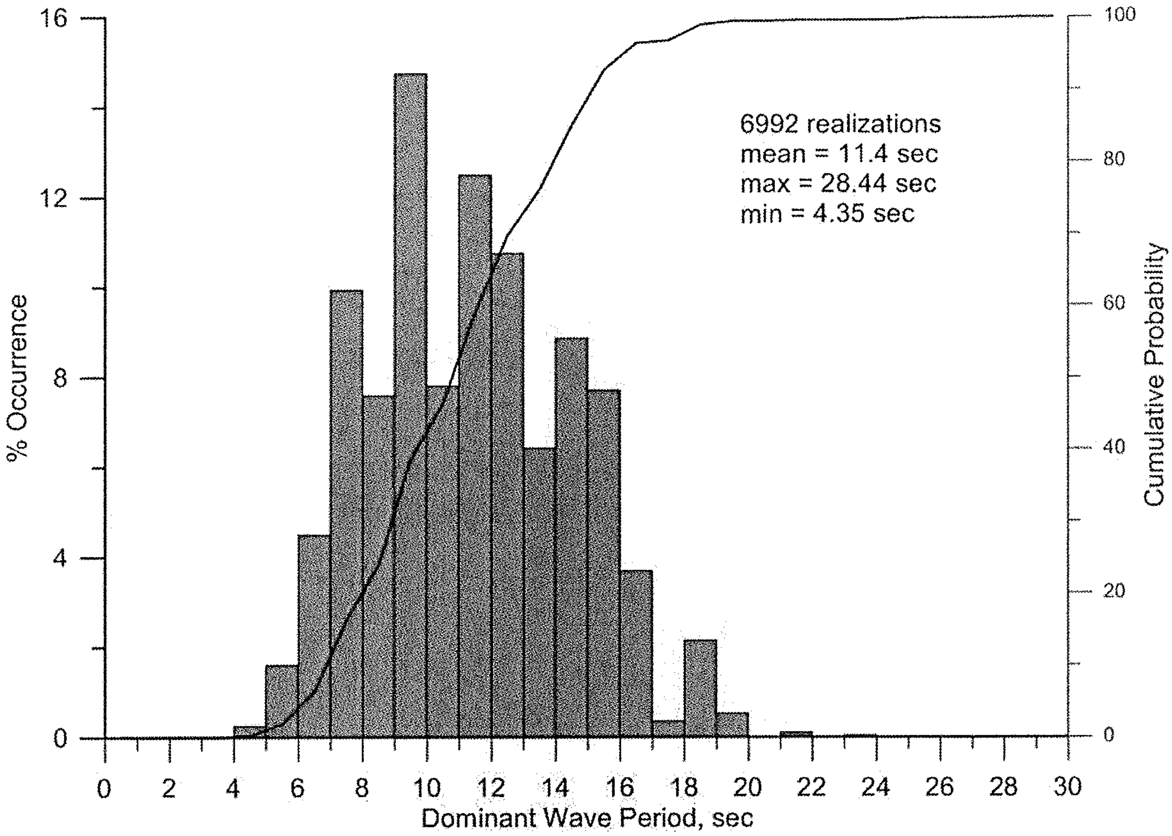

Figure 12c: Probability density (red) and cumulative probability (blue) of wave period data reconstructed from farfield refraction/diffraction analysis of CDIP measurements (cf. Figure 12a). This data used to estimate probability of occurrence of wave run-up frequencies at the MPWSP test well locations on the CEMEX property.

minimum shoaling wave height in the period of record was 0.3 m. Examining Figure 13 in closure detail, it is noted how the refraction effects over local bathymetry create areas around the Salinas River Delta where heights increase to 7.4 m. In these areas, the bay and shelf bathymetry has focused the incident wave energy and these regions of intensified wave energy are referred to as "bright spots." The increased wave heights in these bright spots increase the shear stress generated over the seabed boundary layer and produce large radiation stresses over the water column. This increases the erosion an resuspension of delta sediments, while propelling that sediment suspension downcoast to the south at high littoral drift rates. Conversely, the dark areas in Figure 13 around the MPWSP test well sites are areas where wave heights have been diminished and are termed "shadows". While shadows represent areas of reduced mixing and retarded littoral transport rates they also become areas of positive divergence of drift, where beach and near shore deposition and accretion of sediment occurs.

Generally, wave induced currents (drift) predominate in the nearshore where wave shoaling effects are maximum. Wave induced currents increase with increasing wave height and remain significant over a nearshore domain extending four to five surf zone widths seaward of the shoreline. These currents flow longshore in the direction of longshore wave energy flux (down-drift). These longshore currents increase with increasing wave height and obliquity and flow away from bright spots in the local refraction pattern (Figure 13) and towards areas of shadow. The bright spot in the refraction/diffraction pattern found off the Salinas River in Figure 13, in combination with the relative shadow area off the MPWSP test well site, results in a longshore current flowing away from the Salinas River and toward the MPWSP test well site and beyond; thereby producing a large scale southward flowing net littoral drift in this region of Monterey Bay, as evident in the beach widths in Figure 8. This longshore current system provides a conveyor belt of sediment from the Salinas River to the test well site with an associated non-negative divergence of drift terms in equation 1, that causes the shadow region around the well site to bean area of sediment deposition and beach accretion .

3.3) Model Initialization, River Sediment Flux: The Salinas River is the predominant source of beach sand in the neighborhood of the MPWSP test well sites. Salinas River sediment yield, J, is calculated from USGS gage station streamflow, Q, based on the power law formulation of the sediment rating curve given by equation (6). Inman and Jenkins, (1999), utilize the Salinas River at USGS gage Station, # 11152500 at Sprekels to make this calculation of sediment yield, using $a = 5.83 \times 10^{-11}$ and $b = 1.878$ in equation (6), which results in a coefficient of determination of $r^2 = 0.89833$ when compared against limited sediment flux measurements on the Salinas River, as detailed in Inman and Jenkins, (1999). When applying the rating curve to the historic daily flow rates of the Salinas, it is necessary to distinguish the portion of the total sediment yield that is beach grade sand (bed load sediments) from the residual component of wash load. Wash load consists of the fine grained sediments (silts and clays) that are too fine to be retained on the beach in the presence of wave action. Based on analysis in Chang (2004), it was assumed that 63% of the calculated sediment yield was sand sized bed load when the daily flow rate of the Salinas River was greater than 3000 cfs; and that 100% of the daily sediment flux is wash load when the daily flow rate was less than 3000 cfs.

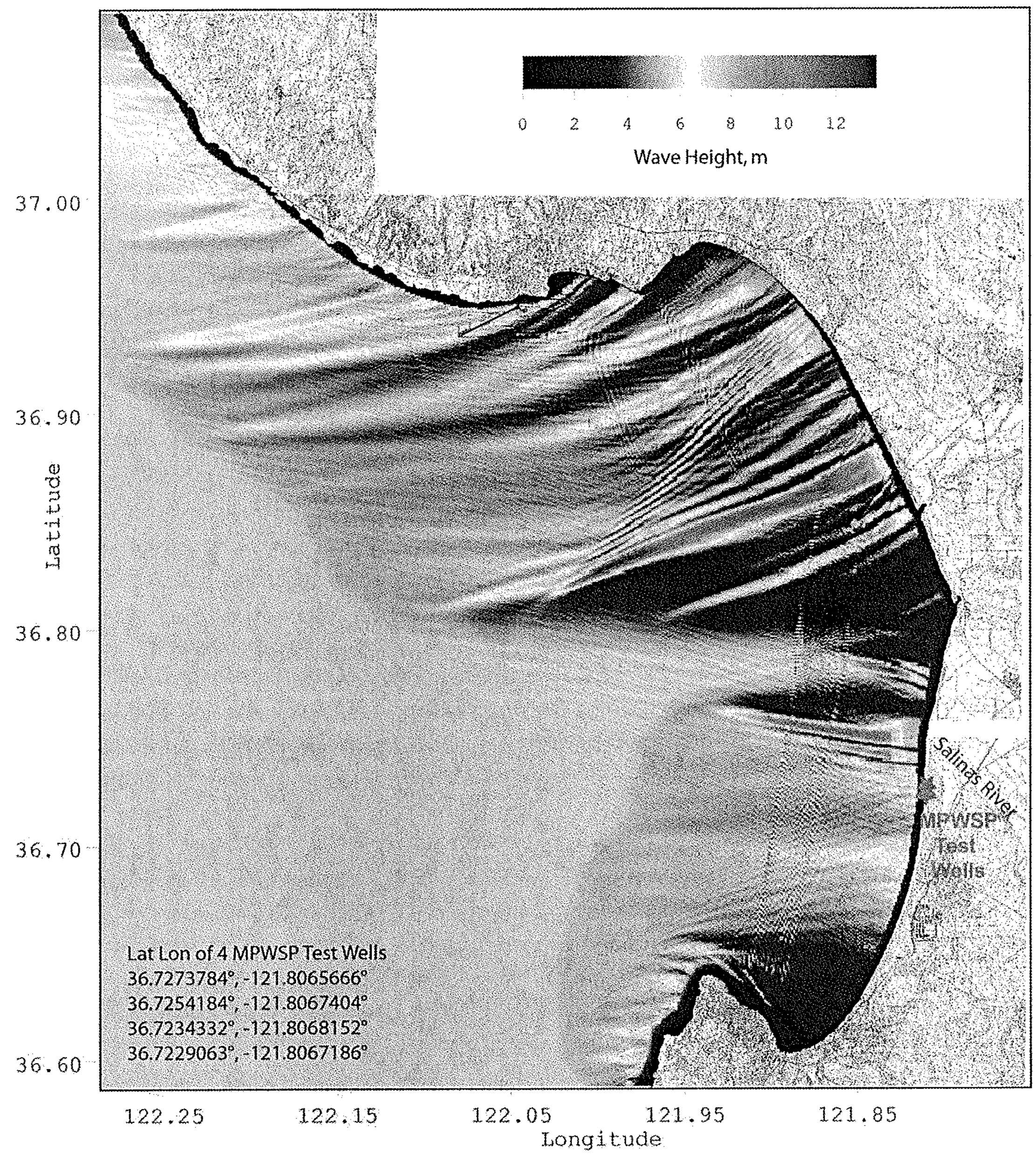

Figure 13: MPSWSP refraction/diffraction pattern for the largest storm in the 1984-2008 period of record, occurring on 5 December 2007. Deep water statistics obtained from CDIP # 071 Harvest Platform monitoring site. Deep water wave height = 5.78 m; period = 18 sec; direction = 265 degrees true. (CDIP, 2008).

Applying these values for bed load/wash load fractions to the flow rates at the Sprekels USGS gage station gives a time series of the annual yield of bed load sediments (sands) for the Salinas River in metric tons. This result is plotted in Figure 14 as a cumulative residual. Climatic trends become more apparent when river sediment yield data are expressed in terms of cumulative residuals J_n, taken as a running cumulative sum of departures of annual values, J_i from their long-term mean values $\bar{J}$, such that $J_n = \sum_{0}^{n}(J_i - \bar{J})$ where n is the sequential value of a time series of n years.

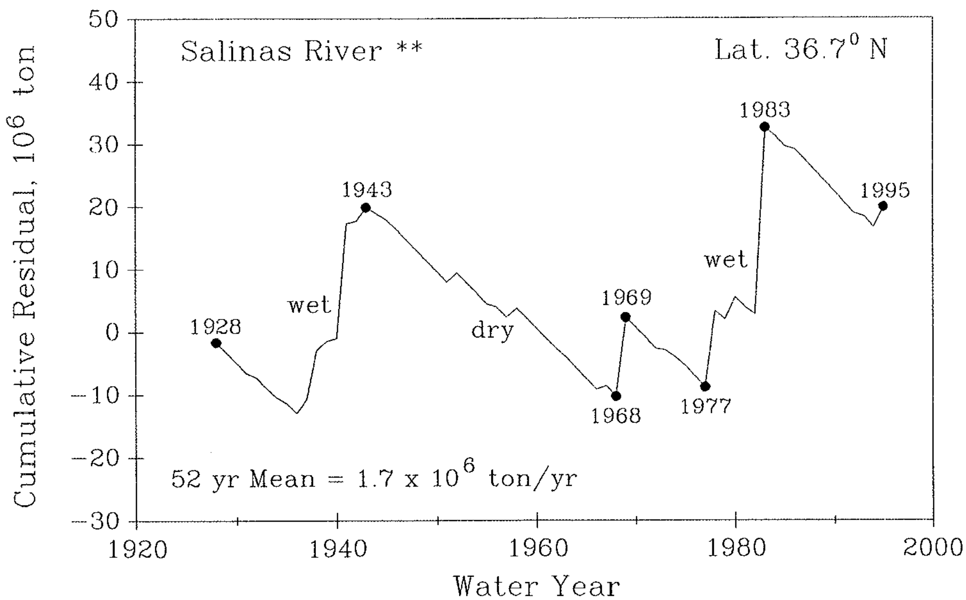

Figure 14: Cumulative residual time series of bed load sediment flux from the Salinas River using a 52-year mean (1944-95) over the period of record.

While the average annual yield of bedload sediments from the Salinas River was found to be 1.7 million metric tons (1944-95), pronounced effects of a series of La Niña (cool-dry) and El Niño (warm-wet) periods can also be found on sediment yield in Figure 20. This is a consequence of variability in local rainfall accompanying La Niña (cool-dry) and El Niño (warm-wet) periods. Figure 15 shows this rainfall variability using the rain gage at Santa Cruz as a proxy for the Monterey Bay climate. Figure 14 and 15 both display a clear change from wet to dry climate beginning in 1944. This is significant because it relates the extreme landward position of the 1933 shoreline contour at the MPWSP test well site in Figure 3 of Jenkins (2012) to a dry period, when Salinas River sediment flux was minimal; (ie., narrow dry beach corresponds to dry periods with

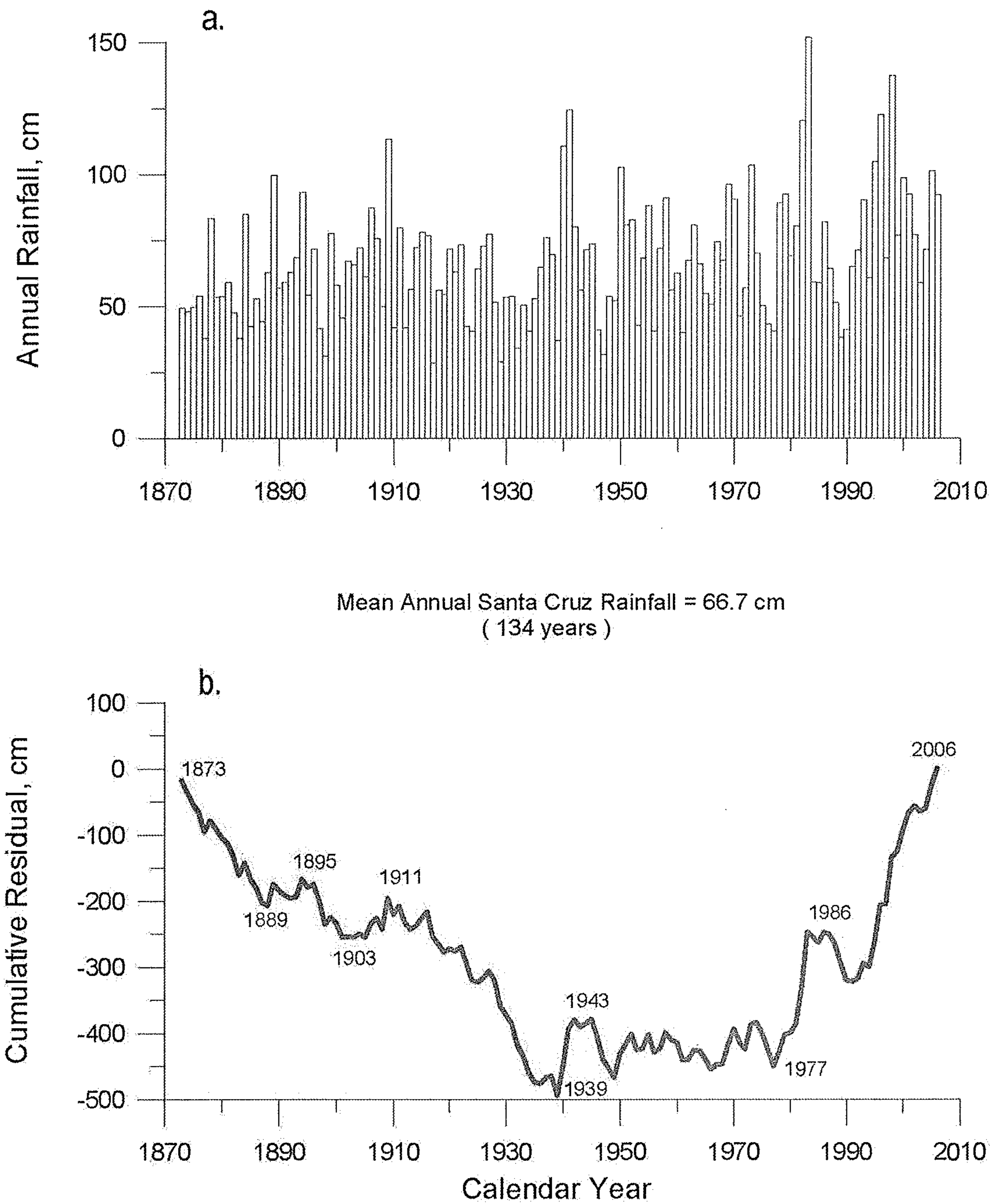

Figure 15: a) Time series of annual rainfall at Santa Cruz, CA. b) Cumulative residual time series of annual rainfall at Santa Cruz, CA .

minimal beach nourishment from river sediment supply). Note in Figure 14 that periods of low sediment yield representing dry climate appear as intervals of decreasing residual (negative slope), while high sediment yield (wet periods) are represented by intervals of increasing residual (positive slope). Within the 52-year period (1944-1995), the data in Figure 15 showed a uniform dry period lasting for about 25 years from 1944 through 1977. However, there was a relatively weak El Niño embedded in 1944-77 drought period that occurred in 1969, which had a peak SOI of -0.8 (Figure). A storm associated with the 1969 El Niño caused
significant flooding and high sediment yield on the Salinas River.

The cumulative residual of the historic sediment yield of the Salinas River reveals a number of significant features having particular importance to the nourishment and long-term stability of the southern beaches in Monterey Bay. Beginning in 1978, the California climate began transitioning into a warmer wetter period characterized by a succession of powerful El Niños, particularly those in, 1978, 1980, 1983, 1993 and 1995, [Inman & Jenkins, 1997]. The wet period has a mean annual suspended sediment flux about 5 times greater, caused by these strong El Niño events that produce floods with an average recurrence of about 5 years (more frequently than beach and shoreline sampling). The sediment flux of the rivers during the three major flood years averages 27 times greater than the annual flux during the previous dry climate. The floods brought by each of these El Niño rain events (Figure 15) delivered many times the long term mean of the Salinas River, causing the cumulative residuals in Figure 14 to abruptly increase. A similar succession of El Niño floods also preceded the cool/dry period of 1944-77, (Figure 15) causing major episodes of sediment yield in 1937, 1938, 1941 and 1943 (Figure 14). The peak annual discharge of sediment (100-year storm) is 9.9 million tons/yr. While a rubber dam has been installed during summer months as part of the Salinas Diversion Project, these sediment flux statistics for the bed load sediments and the yield patterns in Figure 14 are not likely to be effected, because the flux of bed load (sands) predominantly occurs in response to the winter storm floods when the diversion dam will not be in place.

4) Littoral Drift od Sand and Divergence of Drift

To quantify the effect of sediment yield from the Salinas River on littoral drift and beach stability at the MPWSP well sites, we invoke the LCM algorithms of the Coastal Evolution Model (Figure 9) after initializing for historic wave climate and river sediment flux as detailed in Section 3.2 and 3.3. The LCM computational sequence begins with forward refraction calculation using OCEANRDS to solve for the wave height and x and y components of the wave number at each point in the sequence of coupled control cells (Figure 10b). The x and y components of wave number are orthogonalized to compute the significant wave angle in each grid cell relative to the shoreline normal of these near-field computational cells. The calculation is carried shoreward until the wave height meets or exceeds 5/4 the local depth. This condition defines the point of wave breaking. The wave height, H_b wave angle α_b and grid cell location (x_b, y_b) at which this wave breaking condition is met are written into a *breaker file* for use in subsequent potential longshore transport calculations.

The breaker files generated by refraction/diffraction calculations are used to compute the potential longshore transport rates at 6 hour intervals. The formulation for the longshore transport rate is taken from the work of Komar and Inman (1970) according to:

$$q_{L2} = K\left(C_n S_{yx}\right)_b \qquad (11)$$

where q_{L2} is the local potential longshore transport rate; C_n is the phase velocity of the waves; $S_{yx} = E sin\alpha_b\ cos\alpha_b$ is the radiation stress component; α_b is the breaker angle relative to the shoreline normal; $E = 1/8\rho g H_b^2$ is the wave energy density; ρ is the density of water; g is the acceleration of gravity; H_b is the breaking wave height; and, K is the transport efficiency equal to:

$$K = 2.2\sqrt{c_{rb}} \qquad (12)$$

$$c_{rb} = \frac{2g\tan^2\beta}{H_b\sigma^2} \qquad (13)$$

Here c_{rb} is the reflection coefficient which is calculated from a gross estimate of the nearshore bottom slope, as determined from the bathymetry file using the break point coordinates and the position of the 0 MSL contour; and, σ is the radian frequency = $2\pi/T$, where T is the wave period. These equations relate longshore transport rate to the longshore flux of energy at the break point which is proportional to the square of the near breaking wave height and breaker angle. By this formulation, the computer code calculates a local longshore transport rate for each break point locations along the shoreline of the forward refraction grid shown in Figures 13. The potential longshore sand transport rates calculated for these points are ensemble averaged for each 6 hour time step interval within the 1980-2000 simulation period to obtain estimates of the fluxes, q_{L2} in-and-out of the near-field computational cell due to local longshore transport (littoral drift).

Figure 16 shows the time averaged wave-driven fluxes along 17 km of the south coast of Monterey Bay near the Salinas River and adjacent MPWSP test well site. The results are computed from equations (1-6) & (11 - 13) based on CDIP monitoring data and averaged over the 1984-2008 period of record. The upper panel of Figure 16 gives the alongshore variation in wave energy flux, where the highest energy fluxes correspond to the bright spot in the refraction/diffraction at the Salinas River delta shown in Figure 13. Local wave energy fluxes are on average a factor of 2 greater at the MPWSP well sites, as a consequence of the predominant refraction/diffraction pattern in Figure 13. The essential features of this pattern are the sheltering effects on waves approaching from the south/southwest along the south coast of Monterey Bay that is caused by the Monterey Peninsula; and where the shape of the shelf and the Salinas River delta formation that focus wave energy on the delta. The bright spot at the delta and the adjoining shadow areas in the refraction/diffraction features produce a net southward flowing littoral drift of sand (middle panel of Figure 16), directed away from the river and toward the well site; and a positive divergence of drift the neighborhood of the MPWSP test well site. A

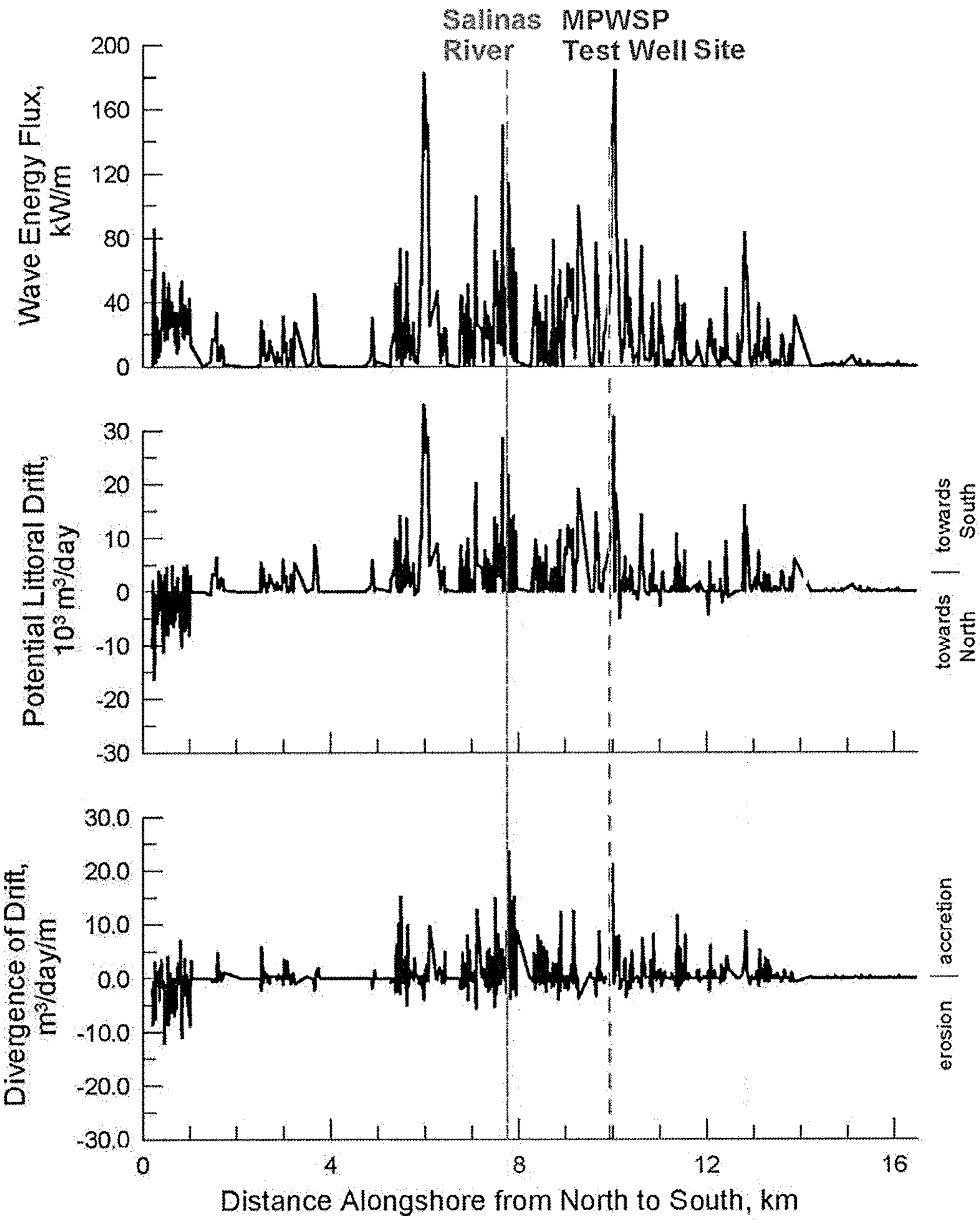

Figure 16: Time averaged wave-driven fluxes along the south coast of Monterey Bay near the Salinas River. Flux computations based on wave forcing from CDIP monitoring data, 1984-2008 (cf Figure 12).

positive divergence of drift = q_{in} - q_{out} > 0 occurs when new sediment is added to a control cell from river sediment yield (the J term in equation 1), and/or when the longshore transport into a control cell, q_{in} ,is greater than the longshore transport leaving that cell, q_{out} . Both conditions contribute to a build-up of sediment in that control cell leading to beach accretion (after equations 2 & 6).

Figure 16 shows a positive divergence of drift with beach accretion along the reach of shoreline from about 2.5 km north of the Salinas River and extending south to about 4 kilometers south of the MPWSP test well site in the neighborhood of the CEMEX sand mining operation. This calculation is consistent with the wide beaches and bluff dunes found in the neighborhood of the Salinas River and test well site in Figure 8. Wind-blown losses of beach sand have been neglected in this simulation, but the positive divergence of drift that averages 15 m^3/day at the MPWSP test well site and about 5 m^3/day at the CEMEX sand mining plant providing a continual source of sand at both sites to sustain adequate beach sand volumes; so much so that wind effects have formed sand dunes in front of the bluff formations evident in Figures 3 & 8. Beaches with long-term averages of positive divergence of drift are not prone to erosion (Inman and Brush, 1972; Inman and Masters, 1991; Inman and Jenkins 1997; Jenkins and Wasyl, 2005). The positive divergence of drift at this new MPWSP test well site is about double the positive divergence of drift at the former MPWSP test well site evaluated in Jenkins (2012) that was located about 2.5 km further down drift to the south, indicating the new well site is a better location with respect to beach stability. Furthermore, there is no discernible difference between the littoral drift and divergence of drift at the CEMEX plant in the present calculations in Figure 16, (that include the effects of sheet pile box coffer dam and tetrapod detached breakwater around the new MPWSP test well site) versus similar calculation in Jenkins (2012) for the former MPWSP test well that did not incorporate shore protection structures.

5) Beach Profile Stability and By-Passing Bars

In this section we use state-of-the-art algorithms for the equilibrium beach profile (Jenkins and Inman,2006) to calculate the long term variability of beach profiles at the new MPWSP test well site. This analysis takes into account the effects of sheet pile box coffer dam and tetrapod detached breakwater on the beach reflection coefficient (equation 13) and on the littoral drift. The beach profile algorithms are calibrated using survey measurements from USGS (2006). The calibrated algorithms are then forced by 24 years of continuous wave data from Figure 12 using time varying divergence of drift (Figure 16) to compute changes in the mean shoreline position from equation (10), in order to determine the probable envelope of profile variability over the well sites.

In Jenkins and Inman (2006), equilibrium beaches are posed as isothermal shorezone systems of constant volume that dissipate external work by incident waves into heat given up to the surroundings. By the maximum entropy production formulation of the second law of thermodynamics (the law of entropy increase), the shorezone system achieves equilibrium with profile shapes that maximize the rate of dissipative work performed by wave-induced shear stresses. Dissipative work is assigned to two different shear stress mechanisms prevailing in separate regions of the shorezone system, an outer solution referred to as the *shorerise* and a *bar-berm* inner solution. The equilibrium shorerise solution extends from closure depth (zero profile change) to the breakpoint, and maximizes dissipation due to the rate of working by bottom friction. In contrast, the equilibrium bar-berm solution between the breakpoint and the berm crest maximizes dissipation due to work by internal stresses of a turbulent surf zone. Both shorerise and bar-berm equilibria were found to have an exact general solution belonging to the class of *elliptic cycloids*. The elliptic cycloid allows all the significant features of the equilibrium profile to be characterized by the eccentricity and the size of one of the two ellipse axes. These two basic ellipse parameters were related In Jenkins and Inman (2006) to both process-based algorithms and to empirically based parameters for which an extensive literature already exists. The elliptic cycloid solutions display wave height, period and grain size dependence and have demonstrated generally good predictive skill in point-by-point comparisons with measured profiles.

Figure 17 shows the envelope of variability of the equilibrium beach profiles calculated by the thermodynamic algorithms from Jenkins and Inman (2006), as applied to the new MPWSP well site with coffer dam and detached breakwater during the historic period 1984-2008. Figure 17 shows that (over the long term represented by this period of record), beach profiles around the well site can cause sand levels to vary vertically by as much as 6 ft., generally accreting 2 ft. above present grade, and eroding 4 ft. below present grade. These extreme sand level variations do not overtop the sheet pile coffer dam or tetrapod detached breakwater, nor do the extreme sand level variations undercut the foundation of either shore protection structure. A critical feature in all of these beach profiles is the formation of an equilibrium sand bar immediately seaward of the tetrapod detached breakwater. Bar formation seaward of hardened shore protection devices are well known to coastal engineering, (Inman and Masters, 1991; Inman and Jenkins, 2004), and are a consequence of the increase in the beach reflection coefficient caused by the steep seaward facing slopes of these structures. In the site-specific case of the new MPWSP well site, the shore protection structures (coffer dam and detached breakwater) are situated high enough upslope on the bar-berm portion of the beach profile that the reflection-induced sand bar remains inside the surf zone (landward of the wave break point). Here, the bar functions act as by-passing pathway for the long shore transport of sand (littoral drift). Hence it is referred to here-in as the "by-passing bar". This by-passing concept is shown conceptually in Figure 18, where the nearshore bathymetry calculated at the MPWSP test well from the equilibrium profiles in Figure 17 is superimposed on the aerial view of the well site from Figure 3. The figure has been annotated to show the how the preponderance of the littoral drift (that moves inside the surf zone) flows around the coffer dam and detached breakwater structures following a pathway provided by the by-passing bar. In essence, the by-passing bar causes the local bathymetry to develop a seaward bulge. This seaward bulge in the local bathymetry causes the surf zone to likewise develop a seaward bulge; and where the surf zone goes, the littoral drift follows. Consequently, the shore protection structures of the new MPWSP well site will not intercept or cut-off the littoral drift in the manner of a shoreline normal jetty structure; and will not diminish the longshore transport rates of sand in the littoral drift that reach the CEMEX sand mining plant. This is further confirmed by the similitude in littoral drift rates and divergence of drift calculations between the new and former MPWSP well sites, as noted in the previous section.

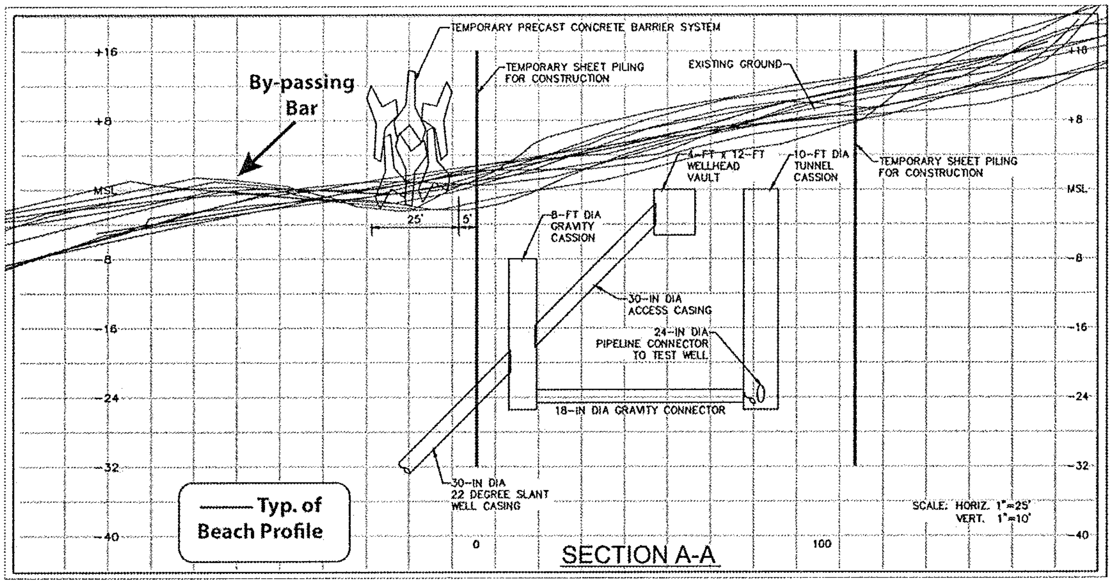

Figure 17: Envelope of equilibrium beach profiles around the updated MPWSP test well site fortified with sheet pile box coffer dam and tetrapod detached breakwater. Profiles computed from long term wave record (Figure 12) based on published algorithms from Jenkins and Inman (2006) and divergence of drift from Figure 16.

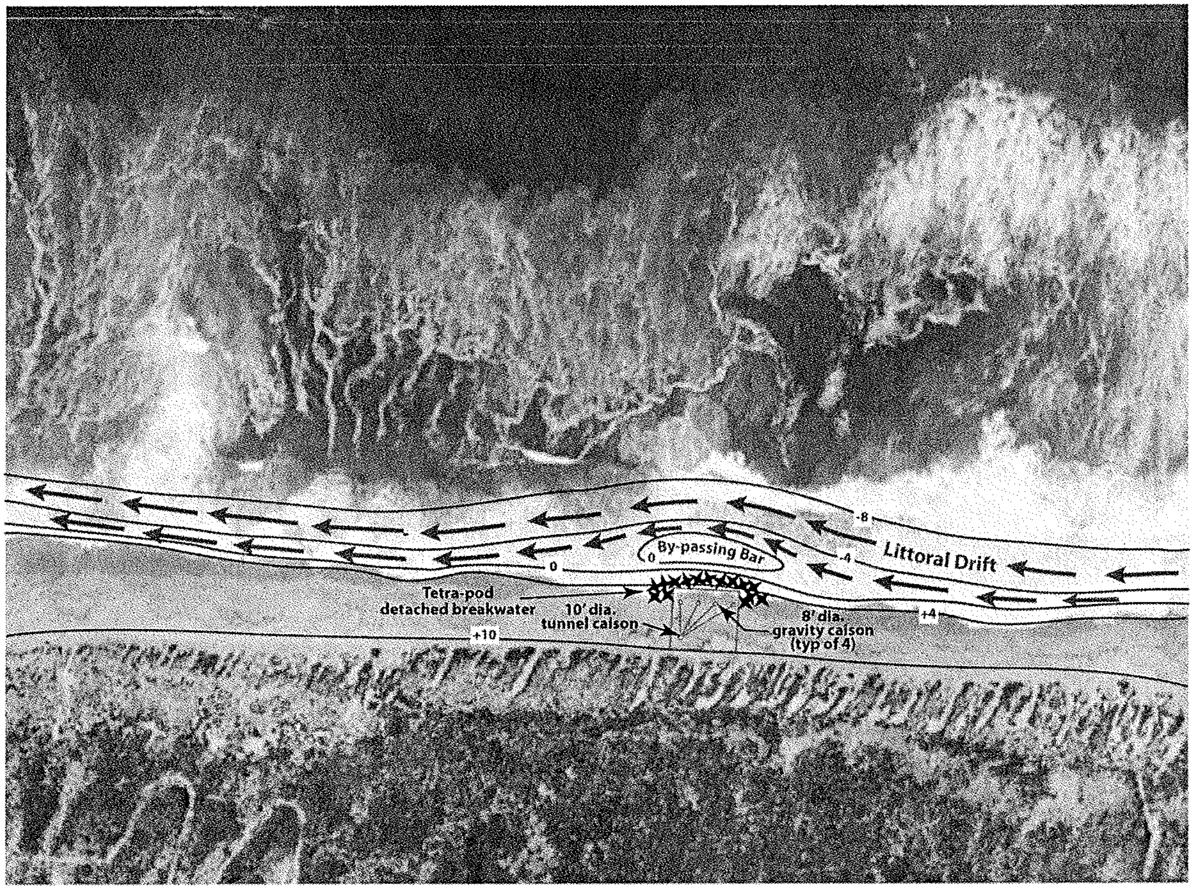

Figure 18: Superposition of nearshore bathymetry at MPWSP test well site fortified with sheet pile box coffer dam and tetrapod detached breakwater, showing littoral drift pathway around well site via by-passing sand bar calculated in Figure 17.

6) Conclusions:

This technical memorandum evaluates littoral sand transport (littoral drift) and beach profile change in the neighborhood of slant intake wells proposed as part of the Monterey Peninsula Water Supply Project (MPWSP). Construction of the intake wells in the swash zone will require a temporary barrier and sheet piling forming a box coffer dam around the well heads and associated hydraulic conveyance to protect equipment and personnel during construction. The seaward face of the sheet pile coffer dam will be protected from wave impact and scour by a temporary detached breakwater constructed from pre-cast concrete *tetrapods* or sand-filled *geo-bags or geo-tubes*. These construction techniques have the advantage of ease in placement and recovery. Conventional rubble mound breakwater construction with quarry stone is prone to scour and burial on sandy beaches, and is extremely difficult to remove once constructed, as each stone must dug out with a clam shell type of apparatus. The tetrapod or sand-filled geo-bags/geo-tubes on the other hand are resistant to wave scour and burial. Tetrapods have a steel lift ring and geo-bags are made of geo-textile fabrics which render both easy to place and recover with conventional rigging and mobile crane operations. These features also reduce placement and recovery schedules, which is an important attribute since construction will need to be accomplished within the five-month (October through February) non-nesting season for the Snowy Plover, and the temporary barrier and sheet piling must be removed prior to March 1.

The beach and bluff dunes at the MPWSP test well site derive their sand supply from proximity to the Salinas River, only 2.2 km up-coast (to the north) from the MPWSP test well site. The net littoral drift of sand in this quadrant of Monterey Bay is southward, from the Salinas River towards the MPWSP test well site and the CEMEX plant further to the south. The southward direction of net littoral drift insures that the beach and dune bluff system at the MPWSP test well site and CEMEX plant is continually nourished by the sediment yield of the Salinas River, the most sediment productive river in California south of the Sacramento River delta. The decisive question to be addressed in this technical memorandum is whether or not the coffer dam and detached breakwater around the test well site will interrupt or prevent this southward directed net littoral drift, and thereby create a beach sand supply deficit in the neighborhood of the CEMEX sand mining operations. We utilized the Coastal Evolution Model (Jenkins and Wasyl, 2005) to make preliminary quantitative assessments of net littoral drift of sand and equilibrium beach profile change at the new MPWSP test well site; and to make comparisons with similar calculations made for the former MPWSP well site in Jenkins (2012). The algorithms of this model have been published in the peer reviewed literature, with the equilibrium beach profile algorithms appearing in Jenkins and Inman (2006), and the divergence of drift and shoreline evolution algorithms appearing in Jenkins et al 2007.

The model simulations show a positive divergence of drift with beach accretion along the reach of shoreline from about 2.5 km north of the Salinas River and extending south for about 4 kilometers beyond the MPWSP test well site in the neighborhood of the CEMEX sand mining operation. This calculation is consistent with the wide beaches and bluff dunes found in the neighborhood of the Salinas River and test well site in aerial photos. Wind-blown losses of beach sand have been neglected in this simulation, but the positive divergence of drift, (that averages 15 m^3/day at the MPWSP test well site and about 5 m^3/day at the CEMEX sand mining plant) provide a continual source of sand at both sites to sustain adequate beach sand volumes; so much so that wind effects have formed sand dunes in front of the bluff formations, as evident in aerial photos. Beaches with long-term averages of positive divergence of drift are not prone to erosion. The positive divergence of drift at this new MPWSP test well site is about double the positive divergence of drift at the former MPWSP test well site evaluated in Jenkins (2012) that was located about 2.5 km further down drift to the south; indicating the new well site is a better location with respect to beach stability. Furthermore, there is no discernible difference between the littoral drift and divergence of drift at the CEMEX plant in the present calculations (that include the effects of the sheet pile box coffer dam and tetrapod detached breakwater around the new MPWSP test well site), versus similar calculation in Jenkins (2012) for the former MPWSP test well that did not incorporate any shore protection structures.

The envelope of variability of the equilibrium beach profiles calculated by the model, (as applied to the new MPWSP well site with coffer dam and detached breakwater), shows that over the long term, beach profiles around the well site can cause sand levels to vary vertically by as much as 6 ft., (generally accreting 2 ft. above present grade, and eroding 4 ft. below present grade). The average significant wave height in the 1984-2008 period of record was $\overline{H}$ = 2.1 m, the average wave period was $\overline{T}$ = 11.3 sec, while the average direction of the waves in was $\overline{\alpha}$ = 286 degrees true. These extreme sand level variations do not allow wave run-up to overtop the sheet pile coffer dam or tetrapod detached breakwater, nor do the extreme sand level variations undercut the foundation of either shore protection structure. A critical feature in all of these beach profiles is the formation of an equilibrium sand bar immediately seaward of the tetrapod detached breakwater. Bar formation seaward of hardened shore protection devices are well known to coastal engineering, and are a consequence of the increase in the beach reflection coefficient caused by the steep seaward facing slopes of these structures. In the site-specific case of the new MPWSP well site, the shore protection structures (coffer dam and detached breakwater) are situated high enough upslope on the bar-berm portion of the beach profile that the reflection-induced sand bar remains inside the surf zone (landward of the wave break point). Here, the bar function provides a by-passing pathway for the long shore transport of sand (littoral drift). The preponderance of the littoral drift moves inside the surf zone, where it will flow around the coffer dam and detached breakwater structures following a pathway provided by the by-passing bar. In essence, the by-passing bar causes the local bathymetry to develop a seaward bulge. This seaward bulge in the local bathymetry causes the surf zone to likewise develop a seaward bulge; and where the surf zone goes, the littoral drift follows. Consequently the shore protection structures of the new MPWSP well site will not intercept or cut-off the littoral drift in the manner of a shoreline normal jetty structure; and will not diminish the longshore transport rates of sand in the littoral drift that reaches the CEMEX sand mining plant.

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ATTACHMENT 3

TECHNICAL MEMORANDUM

Monterey Peninsula Desalination Project
Prepared for California American Water

Draft Date: March 1, 2013
Final Date: March 4, 2013

Authors: R. Rhodes Trussell, Ph.D., P.E., BCEE
Celine C. Trussell, P.E., BCEE

Reviewers: R. Shane Trussell, Ph.D., P.E., BCEE
David R. Hokanson, Ph.D., P.E., BCEE

Job Number: 99.002

Subject: Defining the need for RO second pass for the Desalination Plant

This Technical Memorandum (TM) explains why the Monterey Peninsula Desalination plant requires a second pass in its Reverse Osmosis (RO) system. The TM is prepared as a response to the DRA recommendation to abandon the concept of a second pass RO system as not necessary to meet the CDPH Notification Level (NL) for Boron and secondary standards for sodium and chloride. After careful analysis, it is the professional opinion of Trussell Technologies, Inc. that a full or partial second pass RO system is the most cost-effective way to comply with the CDPH NL for boron and to achieve a wholesome domestic water supply for the Monterey community.

1 - THE SECOND PASS CONCEPT.

Boron, sodium and chloride are all unusually high in seawater and, as a result, all three are of concern in the desalinated water as well. Although the total dissolved solids (TDS) in the desalinated water will be low, unlike most fresh water sources, where calcium and bicarbonate dominate, chloride and sodium comprise a majority of the TDS in desalinated water. The maximum chloride concentration for a single-pass reverse osmosis (RO) system is anticipated to be between 100 and 200 mg/L. The maximum sodium concentration for a single-pass RO system is anticipated to be between 60 and 120 mg/L. These elevated levels are associated both with adverse effects on public health and with adverse effects on the plant life in local landscapes. All seawater desalination plants producing water for domestic use must address this issue. For the past two decades, all large-scale desalination plants built around the globe have accomplished this using a full or partial second pass through the RO process.

The conceptual design for the Desalination Plant, which California American Water proposes to construct in the Monterey area also includes an RO system with a second pass. The first RO pass operates at a very high pressure and treats all the water entering the plant. A little less than half of this water (40% or so) is "recovered" as a desalinated product and a little over half (60% or so) contains most of the salts and is returned to the ocean. In the case of the California American Water design, approximately 40 % of the water "recovered" from the first pass is again passed through a lower pressure, second pass RO system and blended with the remaining "recovered" water from the first pass to produce a final product that meets specifications. Figure 1 illustrates the concept schematically. The flows shown in the Figure are those for a Desalination Plant designed to produce 5 million gallons per day of desalinated water (total product flow 3,470 gpm).

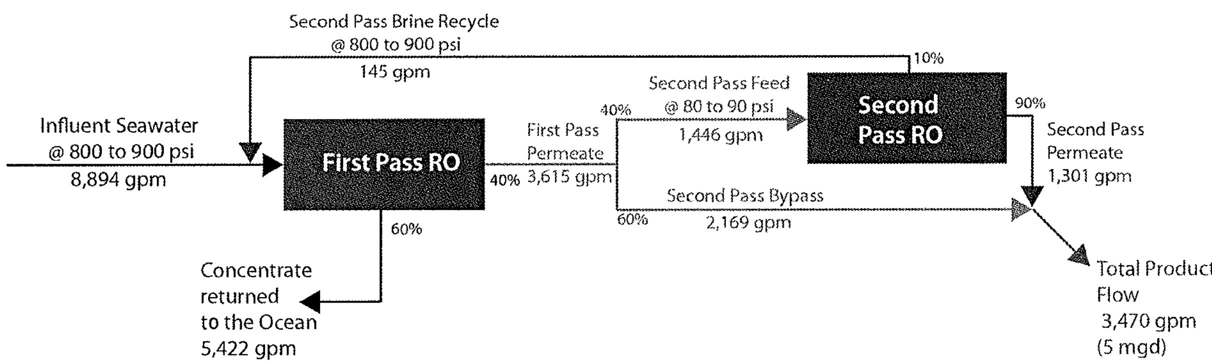

Figure 1 - Schematic of a 5 mgd Seawater Desalination Plant With a 40% Second Pass (Showing Approximate Flows and Pressures)

2 - Establishing Appropriate Goals for Boron, Chloride and Sodium

The issue of greatest concern is the level of boron in desalinated water. The California Department of Public Health (CDPH) has established a Notification Level (NL) of 1 mg/L for boron in drinking water. Should boron contamination be present, at a level exceeding the CDPH NL, California American Water would be required by the Health and Safety Code §116455 to notify the local governing bodies of drinking water consumers (e.g. the City Councils and the County Board of Supervisors) that boron is present in the local drinking water at levels above the Notification Level specified by the California Department of Public Health. CDPH further recommends that CAW directly notify its customers about the presence of boron, and about the health concerns associated with exposure to it (CDPH 2013).

To avoid circumstances that might alarm the public and cause them to lose confidence in the water supply, such as exceeding the NL for a contaminant and having to notify the authorities, water utilities normally design and operate treatment facilities to provide a margin of safety. The magnitude of that margin of safety varies from one circumstance to the next, but it is generally about 0.5 (0.5 x regulatory limit) and rarely more than 0.8 (0.8 x regulatory limit). A margin of safety of 0.5 is normally used when one exceedance can have consequences. The CDPH Notification Level (NL) of 1 mg/L has only one significant figure, so it could be taken that boron levels as high as 1.4 mg/L technically do not exceed this limit. On this basis, a design goal for the maximum concentration of 0.7 might be chosen. California American Water would be more comfortable maintaining a safety margin that guarantees that boron level will never exceed 1.0 mg/L. This would put the design goal for a maximum concentration of 0.50 mg/L.

CDPH has established a secondary Maximum Contaminant Level (MCL) for chloride of 250 ppm. It is also well-known that high sodium intake is associated with hypertension and EPA discussed a sodium MCL as low as 25 ppm several years ago, but has taken no action. Where chloride and sodium are concerned, plant toxicity is probably a larger issue. In fact plant toxicity is also a concern with boron as well. Boron has been shown to be toxic to many plants at concentrations above 0.5 ppm. Plant toxicity from boron can result in leaf burn, leaf cupping, chlorosis (i.e., chlorophyll deficiency), anthocyanin (blue and red leaves), rosette spotting, premature leaf drops, branch dieback, reduced growth, and in extreme cases, necrosis (i.e., cell death). The majority of published research on boron toxicity has focused on yield reduction in agricultural crops and not the impact on plant appearance. However, a plant's appearance is adversely impacted at lower boron levels than those required to reduce crop yield. The appearance of landscape plant species commonly found in California can be affected by boron, chloride and sodium. Poseidon Resources, in support of its Carlsbad project commissioned a study, which examined the likely impact of boron and chloride on local horticulture (Hortscience, 2005). In the study, the following trees and plants were found to be adversely affected by boron levels of between 0.5 and 1.0 mg/L and chloride levels between 100 and 240 mg/L: Oranges, Lemons, Coast Redwoods, the Chinese holly, Junipers, Xylosma, Camelias, the Crape Myrtle, the Gardenia, the Giant Bird of Paradise, Heavenly Bamboo, Hydrangea, Lily of the Nile, Philodendron, Photinia, Pink Trumpet Vine, the common Rose, Southern Magnolia, Violet trumpet vine, and Wheeler's dwarf pittosporum. The study reported that even at boron concentrations as low as 0.5 ppm, there are plants that are sensitive to boron, orchids being a well-known example.

Finally, boron in drinking water also results in elevated boron levels in recycled waters. Boron is already an issue in recycled waters because the common use of soaps and other products, which contain boron and, as a result high levels of boron in recycled waters can adversely affect agriculture. For this reason many of the State's Regional Water Quality Boards recommend that boron in recycled water be maintained below 0.5 to 0.7 mg/L. High levels of boron in drinking water aggravate this problem as well. Use increments (increase from drinking water to recycled water) typically range between 0.2 and 0.3 mg/L.

The following is a summary of the considerations on water quality listed above:

A. Boron, chloride and sodium are all at very high levels in seawater and, as a result they are also unusually high in desalinated water.
B. Virtually all large drinking water desalination plants constructed in the last 20 years use a second pass in RO to bring these minerals to lower levels.
C. In order to avoid exceeding the CDPH NL for boron with a reasonable margin of safety, maximum boron levels in the desalinated water must be kept below 0.7 mg/L. To meet a maximum of 0.7 mg/L, the median level must be 0.5 mg/L.
D. Several plant species commonly used in horticulture (e.g. Junipers, Camelias, Crape Myrtle, Gardenias, Hydrangeas, Philodendron, the common Rose, etc.) begin to show adverse effects to boron in the range of 0.5 and 0.75 mg/L.
E. When boron in drinking water rises above 0.5 mg/L, recycled water customers may become concerned with the increased boron concentrations observed in the recycled water.

Based on all these considerations, Trussell Technologies, Inc recommends that California American Water set its goals for wholesome domestic drinking water at a median boron level of 0.5 mg/L and maximum boron level of 0.7 mg/L and that these goals be incorporated into the design of the Desalination Plant.

3 - Establishing the Level of Boron in Seawater

Seventy-seven boron measurements were made during the study CAW conducted at Moss Landing and a similar number were made as part of the Santa Cruz study. An even more comprehensive database has been developed in Redondo Beach as part of the study being conducted by West Basin MWD. Figure 2 shows a plot of the data

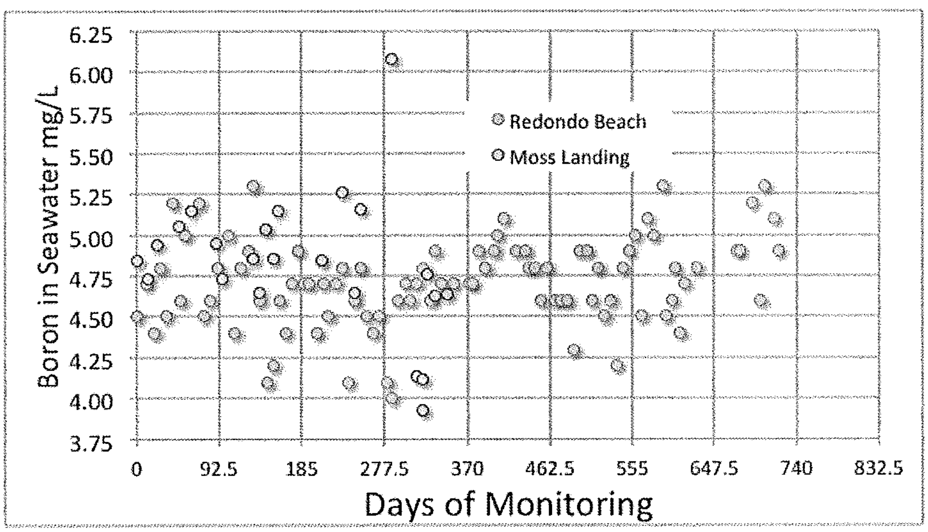

Figure 2 – Results of boron monitoring at Moss Landing and Redondo Beach

gathered at both locations. Except for the one measurement of 6 mg/L at Moss Landing, these two data sets don't appear significantly different. Table 1 summarizes minimum, median and maximum boron levels measured through all three projects.

There are a lot of similarities in all these data, but it seems that the maximum value at Moss Landing may be an artifact (see figure 2).

Table 1 - Boron Levels Measured at Three Locations			
Location	Min	Med	Max
Santa Cruz Pilot	-	4.4	5.4
Santa Cruz Intake	-	4.4	5.0
Moss Landing	3.9	4.8	6.1
Redondo Beach	4.0	4.7	5.3

For purposes of the Monterey Desalination Project, a median value of 4.8 mg/L and a maximum value of 5.4 mg/L will be used as a basis of design.

4 - Establishing What SWRO Will Do With and Without a Second Pass

The removal of boron by SWRO is influenced by a number of variables including: membrane selection, the temperature and pH of the ocean (and, hence with season of the year), the pressure used by the SWRO plant, the age of the membranes and the details of energy recovery methods employed. Pilot testing at Moss Landing showed that the boron in the product water tends to be about 1.0 mg/L (median value), ranging between 0.8 and 1.3 mg/L (max. value), but, while these results do provide useful perspective, they do not provide a direct assessment of full-scale performance. For example, the pilot did not include energy recovery devices and it employed new membranes. The most modern energy recovery devices introduce a small amount of concentrate into the upstream side of the RO, making full-scale boron levels a bit worse than those experienced at pilot level. Moreover, the RO membranes themselves deteriorate over time and, as a result, the salinity and boron concentrations of the permeate they produce gradually increase as well. Most design manuals for SWRO recommend an allowance be made for an annual deterioration in permeate quality of 5 to 15 percent. Assuming a 10 percent increase in boron passage each year, a membrane that produces median and maximum boron levels of 1.0 and 1.3 mg/L in its first year would be expected to produce median and maximum boron levels of 1.5 and 1.9 mg/L at the end of its five year life. This means that, if the Desalination Plant is built with a single pass RO, the desalinated water would exceed California American Water's proposed goals (Section 2, above) in the first year and, in the 5th year, the desalinated water would exceed the CDPH NL half the time.

There are now new high-boron-rejection membranes on the market, which perform better than those used in the testing at Moss Landing, but these membranes can cost more and require significantly more additional energy to operate than does a partial second pass.

Based on these considerations, it is concluded that a desalination plant with a single pass RO would produce median boron level of 1.0 mg/L during its first year of operation, declining to a median level of more than 1.5 mg/L near the end of its fifth year of operation. The same single pass plant would produce a maximum of 1.3 mg/L in its first year of operation, declining to approximately 1.9 mg/L near the end of its fifth year of operation.

Thus it is concluded that the performance of a desalination plant with a single pass RO will not be consistent with the goals California American Water has set for a wholesome domestic water supply.

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ATTACHMENT 4

AGREEMENT TO FORM THE MONTEREY PENINSULA WATER SUPPLY PROJECT GOVERNANCE COMMITTEE

This AGREEMENT TO FORM THE MONTEREY PENINSULA WATER SUPPLY PROJECT GOVERNANCE COMMITTEE ("**Agreement**") is made and entered into as of March 8, 2013, by and among the **MONTEREY PENINSULA REGIONAL WATER AUTHORITY** ("**MPRWA**"), the **MONTEREY PENINSULA WATER MANAGEMENT DISTRICT** ("**MPWMD**"), the **COUNTY OF MONTEREY** ("**County**"), and the **CALIFORNIA-AMERICAN WATER COMPANY** ("**Cal-Am**"). The MPRWA, the MPWMD, the County, and Cal-Am are sometimes referred to individually herein as a "**Party**," and collectively as the "**Parties**."

I. Formation of Governance Committee

Pursuant to the terms of this Agreement, the Parties hereby form the Monterey Peninsula Water Supply Project Governance Committee ("**Governance Committee**") comprised of representatives of the MPRWA, the MPWMD, the County, and Cal-Am to ensure efficient and effective public input into the development and operation of the Monterey Peninsula Water Supply Project ("**Project**"). Cal-Am's entry into this Agreement is expressly conditioned upon its legal obligations to abide by the orders and decisions of the California Public Utilities Commission ("**CPUC**"). Therefore, should the CPUC order Cal-Am not to participate in this Agreement, Cal-Am shall be relieved of all obligations set forth in this Agreement and this Agreement may be terminated by Cal-Am upon such CPUC order. Further, if the CPUC issues any order or decision that conflicts with any particular provision of this Agreement, Cal-Am shall be relieved of any and all obligations to abide by the conflicting provision of this Agreement.

II. Definitions

A. Application A.12-04-019. Application of California-American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates, filed with the CPUC on or about April 23, 2012.

B. ASR Infrastructure. The facilities used to inject into and extract potable water from the Seaside Groundwater Basin, as described in Application A.12-04-019. These facilities will include the Aquifer Storage and Recovery ("ASR") wells and related appurtenances, the backflush pipeline, the recirculation pipeline and the ASR pipeline.

C. Brine Discharge Infrastructure. Facilities located outside the desalination plant site that are used to dispose of brine into the ocean. These facilities will include the brine disposal pipeline, the brine receiving station, any modification to the MRWPCA existing outfall, or a new outfall, or potentially the use of other existing outfalls with or without modifications.

D. Cal-Am Notification. The written notification from Cal-Am to the Chair of the Governance Committee that a matter is ready for consideration, consultation, or action by the Governance Committee as provided herein, and as further defined within Section V.B.

E. CEQA. The California Environmental Quality Act.

F. Contracts. One or more of the contracts between Cal-Am and a selected contractor, valued in excess of $1 million, relating to the design and/or construction of the following facilities: (1) the Desalination Infrastructure, (2) the Source Water Infrastructure, (3) the Brine Discharge Infrastructure contracted for by Cal-Am, (4) the Product Water Pipeline, (5) the Raw Water Pipeline; (6) the ASR Infrastructure, and (7) the Terminal Reservoir Infrastructure. Contracts for one or more of the facilities identified above in this definition may be combined into a single contract. In addition, the design and construction of a single facility identified above in this definition may be combined into a single contract.

G. CPCN. The Certificate of Public Convenience and Necessity, if ordered by the CPUC, within Application A.12-04-019.

H. Desalination Infrastructure. Facilities located within the desalination plant site that are used to create potable water from either an ocean source water, brackish source water or a combination thereof, and appurtenant facilities needed to dispose of brine to the Brine Discharge Infrastructure, dispose of wastewater (i.e. process water and sanitary discharge), and any needed facilities that may be required to prevent export of native Salinas River Groundwater Basin water.

I. Desalination Project. The combination of the Desalination Infrastructure, the Brine Discharge Infrastructure, the Source Water Infrastructure, the Product Water Pipeline, the Raw Water Pipeline, and the Terminal Reservoir Infrastructure.

J. GWR Project. Groundwater replenishment project to be implemented by MRWPCA and/or MPWMD which involves advanced treatment of wastewater and the injection of product replenishment water into the Seaside Groundwater Basin. This project includes facilities for the treatment, conveyance, and injection of the product replenishment water.

K. MRWPCA. The Monterey Regional Water Pollution Control Agency.

L. Product Water Pipeline. Facilities used to convey potable water from the Desalination Infrastructure to the Terminal Reservoir Infrastructure and to Cal-Am's existing distribution system at the Eardley Pump Station.

M. Project. The Monterey Peninsula Water Supply Project as proposed in Application A.12-04-019, and as it may be modified by the CPCN issued in response to that Application.

N. Public Entity Members of the Governance Committee. The MPRWA, the MPWMD, and the County. Cal-Am is not a Public Entity Member of the Governance Committee.

O. Raw Water Pipeline. Facilities used to convey feedwater (i.e., raw water) from the Source Water Infrastructure to the Desalination Infrastructure.

P. Source Water Infrastructure. Wells and appurtenant facilities (or alternative contingent intake facilities) that are used to extract and convey feedwater (i.e., raw water) to the Raw Water Pipeline. These facilities will include the slant intake wells and related appurtenances (if permitted) as well as alternate contingent intakes such as a Ranney Well or open ocean intake as submitted by Cal-Am in its contingency plans.

Q. Terminal Reservoir Infrastructure. Facilities used to pump and store potable water in storage tanks east of the City of Seaside along General Jim Moore Boulevard. These facilities will include the terminal reservoir, terminal reservoir pump station, overflow facilities and related appurtenance needed to assist in the moving of water to and from the ASR Infrastructure, other ASR facilities, and Product Water Pipeline.

R. Value Engineer. The professional engineer(s) to be retained by, or to consult with, Cal-Am to perform a value engineering analysis for the Desalination Project to potentially lower the costs of, or maximize the value of, the Desalination Project to Cal-Am's ratepayers, including matters concerning the cost effectiveness, performance, reliability, quality, safety, durability, effectiveness, or other desirable characteristics of the Desalination Project.

The Parties acknowledge that the Project is still under development and several aspects of the Project may be modified as planning continues and as may be ordered by the CPUC. If necessary to address future modifications to the Project, the Parties agree to cooperate in good faith to reach agreement to amend the definitions set forth herein as necessary to fulfill the purpose of this Agreement.

III. Membership and Voting

Each of the Public Entity Members of the Governance Committee shall be represented on the Governance Committee by one elected official of such entity and one alternate who shall also be an elected official. No individual person may be appointed as the primary or alternate representative of more than one Party. If MPRWA ceases to exists, then the cities that are members of the MPRWA at the time of the MPRWA's termination shall collectively choose a "city representative" that will take the place of the MPRWA representative on the Governance Committee. Cal Am shall be represented by the President of Cal-Am or the President's alternate, whom the President may designate to act on his or her behalf at anytime. The Governance Committee shall appoint a "Chair" and "Vice-Chair" from the primary (non-alternate) elected officials appointed to the Governance Committee. Each of the Public Entity Members of the Governance Committee shall have a single equal vote in decision-making. Cal-Am shall not have a vote for purposes of the issuance of decisions or recommendations by the Governance Committee. However, Cal-Am shall, unless it abstains from doing so, state its preference with respect to any decision or recommendation made by the Governance Committee (the "**Cal-Am Preference**") at the time that any decision or recommendation is made by the Governance Committee and the Cal-Am Preference shall be recorded within the meeting minutes together with a summary of any explanation provided by Cal-Am for the Cal-Am Preference.

IV. Powers

A. Purpose. The purpose and function of the Governance Committee shall be to: (i) consult with, advise and, in some circumstances, provide direction to, Cal-Am concerning the design, permitting, construction, operations, maintenance, repairs, and replacements of the components of the Desalination Project; and (ii) serve as the entity which Cal-Am regularly updates as to Desalination Project status and issues. The members of the Governance Committee shall diligently consider all matters and cause the Governance Committee to timely and promptly issue decisions or recommendations brought before it as provided pursuant to the terms of this Agreement.

B. Waiver of Action. Upon motion and affirmative vote of the Governance Committee (pursuant to Section VII of this Agreement), the Governance Committee may choose to waive its right to issue a decision or recommendation with respect to any matter for which the Governance Committee is afforded such right herein. The purpose of the Governance Committee's right to waive its right to make any specified decision or recommendation herein is to empower the Governance Committee to avoid issuing any decision or recommendation, which, in its determination, would violate any law, unreasonably delay efforts to develop water supplies for the Monterey Peninsula, or otherwise compromise the public interest.

V. Governance Committee Action; Procedures

A. Matters Subject to Governance Committee Action. Matters for consideration, consultation, decision, or recommendation by the Governance Committee shall be divided among three categories, with varying processes for consultation, recommendations, and/or decision-making, as follows:

Category A: The Governance Committee makes the decision or recommendation respecting the matter after receipt of a written recommendation from Cal-Am, and upon issuance of its decision or recommendation, the Governance Committee provides a written explanation of the reasons for its decision to Cal-Am within seven (7) calendar days following its decision or recommendation. Thereafter, Cal-Am will comply with the decision or recommendation issued by the Governance Committee so long as the decision or recommendation is consistent with the terms of this Agreement. However, notwithstanding any provision of this Agreement, for any matter covered by Category A that relates to an action which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, as defined by section 21065 of the California Public Resources Code, no decision or recommendation shall be made by the Governance Committee as to the subject matter unless and until such time as the action has been subject to review by an appropriate agency in accordance with CEQA. The foregoing provision shall not be construed as an agreement or determination by or among any of the Parties that CEQA applies to any action of the Governance Committee. This Agreement is itself not a "project" as defined by section 15378 of the CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3) because it is an organizational activity that will not result in direct or indirect physical changes in the environment and this Agreement makes no commitment to any project.

Category B: The Governance Committee makes a recommendation respecting the matter after receipt of a written recommendation from Cal-Am. However, Cal-Am may determine, at its sole discretion, whether or not to follow the Governance Committee's recommendation, provided that if Cal-Am chooses not to follow the recommendation, Cal-Am shall provide a written explanation of Cal-Am's reasons for its decision not to follow the recommendation within ten (10) calendar days following the issuance of the Governance Committee's recommendation. Further, should Cal-Am choose not to follow the recommendation of the Governance Committee, then any Party may raise the issue for review by the CPUC during Cal-Am's next general rate case.

Category C: Cal-Am makes the decision respecting the matter after receiving a recommendation from the Governance Committee. Cal-Am need not issue a written explanation for its decision, although should Cal-Am choose not to follow the recommendation of the Governance Committee, then any Party may raise the issue for review by the CPUC during Cal-Am's next general rate case.

B. Procedure for Cal-Am Notification. Whenever Cal-Am is presented with, or becomes aware of, a matter that falls within any of the subjects identified herein for consideration, consultation, decision or recommendation by the Governance Committee that is ripe for presentation to the Governance Committee, Cal-Am shall, in writing, promptly notify the Chair of the Governance Committee ("Cal-Am Notification"), who shall schedule the matter for consideration by the Governance Committee. For purposes of this Agreement, a matter shall be deemed ripe for presentation to the Governance Committee at such time as either specified within the matters set forth below, or for any matter for which no specification is provided, Cal-Am shall determine the time(s) at which the matter is appropriate for presentation for consultation, decision, or recommendation by the Governance Committee consistent with the purpose of this Agreement. Unless a different period is specified herein, for all matters for which a decision or recommendation is to be made by the Governance Committee, the Governance Committee shall issue its decision or recommendation within ten (10) calendar days following receipt of the Cal-Am Notification. If the Public Entity Members of the Governance Committee determine that the Governance Committee requires more than the prescribed time period provided for in this Agreement to act on any matter that is the subject of the Cal-Am Notification, the Chair of the Governance Committee may, within seven (7) calendar days following receipt of the Cal-Am Notification, request a reasonable extension of time by written request to Cal-Am, and Cal-Am and the Public Entity Members of the Governance Committee shall cooperate in good faith to agree upon and set a reasonable alternative deadline for action on the subject matter to the extent that such an extension would not unreasonably delay the Project, not unreasonably delay required CPUC filings by Cal-Am, or otherwise compromise the public interest. So as to avoid undue delay, if the Governance Committee fails to make any decision or provide any recommendation upon any matter brought before it (including all Category A decisions) on or before the expiration of the prescribed period for action by the Governance Committee (or the period of any extension agreed to by Cal-Am), or if the Governance Committee affirmatively waives its right to make a decision or recommendation respecting a matter before it, then Cal-Am may make the subject decision without a decision or recommendation, as applicable, by the Governance Committee.

C. Cal-Am Status Presentations and Governance Committee Recommendations Thereon. At each meeting of the Governance Committee, Cal-Am shall provide a report as to the status of the Project, which shall be presented by one or more individuals knowledgeable about the material aspects of the Project. Upon reasonable advance written notice, the Governance Committee may request that Cal-Am include within its status presentation to the Governance Committee the status of any matter that is set forth in any of the three categories for decision, recommendation, or consultation established below, together with an explanation of any pending or soon-to-be-pending decisions or options concerning the subject matter. The Governance Committee may issue, in writing, any recommendation concerning a subject matter included within Cal-Am's presentation. Cal-Am may determine, at its sole discretion, whether or not to follow the recommendation, provided that if Cal-Am chooses not to follow the recommendation and the subject matter is a matter covered by either Category A or Category B, Cal-Am shall, within ten (10) calendar days following issuance of the Governance Committee's recommendation, provide a written explanation of the reason(s) for Cal-Am's decision not to follow the recommendation. If the subject matter is a matter covered by Category C or is not set forth within any of the three categories set forth below, Cal-Am need not issue a written explanation of Cal-Am's reasons for its decision not to follow the recommendation.

D. Categories for Matters Subject to Governance Committee Action. Matters for consideration, consultation, decision, or recommendation by the Governance Committee shall be divided among the following three categories as follows:

Category A

1. This matter concerns the "GWR Recommendation," which specifically is whether Cal-Am shall: (i) pursue a water purchase agreement, acceptable to Cal-Am, for the purchase of water from the GWR Project, and consequently Cal-Am shall develop smaller Desalination Infrastructure with a capacity of approximately 6.4 MGD (or as specified in the CPCN); or (ii) forgo the pursuit of a water purchase agreement for the GWR Project, and consequently Cal-Am shall develop larger Desalination Infrastructure with a capacity of approximately 9.6 MGD (or as specified in the CPCN). If the GWR Recommendation becomes ripe for recommendation, as specified in the paragraph below, before a CPCN is issued upon Application A.12-04-019, the Governance Committee shall not issue any binding recommendation concerning the GWR Recommendation. If the GWR Recommendation becomes ripe for recommendation, as specified in the paragraph below, after a CPCN is issued upon Application A.12-04-019, the Governance Committee shall decide whether to recommend that Cal-Am pursue the GWR Project or not (as set forth above), which recommendation shall then be subject to CPUC approval or rejection pursuant to the procedure specified herein. The Governance Committee shall make this recommendation based upon criteria to be mutually-agreed to by the Parties, negotiating in good-faith, after the execution of this Agreement.

The GWR Recommendation shall become ripe for a recommendation to be made by the Governance Committee (i) no earlier than the date Cal-Am accepts the 30% Design from the contractor retained for the design of the Desalination Infrastructure, (ii) no later than that date upon which Cal-Am is prepared to issue a notice to proceed to a contractor to commence construction of the Desalination Infrastructure, (iii) after the CEQA lead agency has certified the environmental impact report for the GWR Project and approved the GWR Project, and (iv) while there is sufficient time for the GWR Recommendation to be made and for the CPUC to review and approve that recommendation, without otherwise delaying the Project. The GWR Recommendation shall be made by the Governance Committee, in writing with an explanation of the reasons for its decision, within sixty (60) days following receipt of the Cal-Am Notification concerning this matter. The recommendation issued by the Governance Committee shall be submitted by Cal-Am to the CPUC for approval or rejection pursuant to a Tier 2 Advice Letter (or at the direction of the CPUC, an alternate form of submission) within ten (10) calendar days following issuance of the GWR Recommendation by the Governance Committee for the CPUC's review and approval. To avoid undue delay of the Project, and notwithstanding the ripeness of the GWR Recommendation as described above, if on the date that is ninety (90) days prior to the date upon which Cal-Am anticipates being prepared to issue a notice to proceed to a contractor to commence construction of the Desalination Infrastructure, no public agency has issued a resolution or order that declares that it is prepared to issue a notice to proceed to a contractor to commence construction of the GWR Project, then Cal-Am may make the decision with respect to the GWR Recommendation, in its sole discretion, without soliciting or obtaining the GWR Recommendation from the Governance Committee.

2. The Governance Committee shall select a Value Engineer(s) to facilitate and report on the proposed value engineering for the Desalination Project, with consideration given to any

recommended engineer submitted by any member of the Governance Committee. Cal-Am shall conduct the procurement for the Value Engineer and, consistent with the processes set forth in Categories B(1), B(2) and C(2) relating to Contracts, seek recommendations from the Governance Committee for the contract between Cal-Am and the Value Engineer. After reviewing the results of the procurement process, the Governance Committee shall decide which engineer is to be retained by Cal-Am as the Value Engineer for the Desalination Project. This matter shall be ripe for decision before Cal-Am accepts the 30% Design from the contractor retained for the design of the Desalination Infrastructure, or at any other time that Cal-Am intends to retain a Value Engineer for any other infrastructure constructed as a component of the Desalination Project.

3. Subsequent to the issuance of the CPCN and subsequent to the selection of any design-build contractor(s) for the Desalination Infrastructure, the Governance Committee may issue decisions concerning architectural renderings for the Desalination Project. The Governance Committee shall be presented with architectural renderings for decisions regarding the same when such architectural renderings are complete and upon any subsequent modifications thereto. The Governance Committee may also, in its discretion, appoint a representative to consult with Cal-Am regarding other external features or aesthetics of the Desalination Project. Upon a determination of the Governance Committee or its representative, the Governance Committee's representative and Cal-Am shall present to the Governance Committee options pertaining to the Desalination Project's external feature or aesthetics, upon which the Governance Committee may decide which option to pursue. Notwithstanding any provision of this paragraph, the Governance Committee may not issue a binding decision concerning the Desalination Infrastructure's architectural renderings, or the Desalination Project's external features or aesthetics, if the decision would in the opinion of the design-build contractor, increase the capital or operational cost of the Desalination Infrastructure.

4. Subsequent to the issuance of the CPCN, the Governance Committee may issue decisions concerning procurement of alternative (non-Pacific Gas & Electric) energy supplies for the Desalination Infrastructure, including but not limited to waste-to-energy, so long as such decisions result in lowering the Desalination Infrastructure's estimated unit price for power. This matter shall be ripe for decision at any time a formal written proposal concerning alternative power is presented by one or more of the Parties for consideration.

Category B

1. Prior to the issuance of a request for qualifications, request for proposals, or request for bids, as applicable, relating to the procurement of a Contract, the Governance Committee may recommend qualifications and selection criteria for such Contract.

2. Prior to the execution of any Contract not executed on or before the date that is thirty (30) calendar days after the effective date of this Agreement, and upon presentation and recommendation by Cal-Am to the Governance Committee after Cal-Am has reviewed and evaluated proposals or bids, as applicable, and negotiated with the contractor a Contract that, in the opinion of Cal-Am, is ready for execution by and between Cal-Am and the contractor, the Governance Committee may recommend which contractor should be retained under the Contract, and issue any recommendations concerning the terms of the final Contract. When presenting a Contract to the Governance Committee for its consideration and recommendation, Cal-Am shall provide to the Governance Committee a copy of all responsive proposals or bids received for the pertinent work, except for any proprietary information provided by contractors submitting responsive proposals or bids, together with a written description of the process Cal-Am undertook to select a recommended Contractor, a summary of the considerations that Cal-Am deems pertinent to support its recommendation, and any other information that Cal-Am believes will assist the Governance Committee in its review of the recommended Contract and contractor.

3. The Governance Committee may review and issue recommendations concerning major changes to the Desalination Project at key stages of the design process, including:

- Basis of Design

- 30% Design
- 60% Design
- 90% Design, and
- Final Design

As used in this paragraph, major changes to the Project shall include changes causing an increase or decrease in costs of the Desalination Project that exceed $1 million.

4. The Governance Committee may issue recommendations concerning the establishment of a community outreach program.

5. The Governance Committee may recommend the Desalination Project's aesthetic attributes and design consistent with community values if not covered by Category A(3) above;

6. The Governance Committee may coordinate with Cal-Am and recommend solutions to issues concerning the use of the Brine Discharge Infrastructure;

7. The Governance Committee may review and recommend whether to adopt any value engineering recommendations issued by the Value Engineer;

8. The Governance Committee may review and recommend whether to approve any change order pertaining to any component or components of the Desalination Project, if the change order exceeds $1 million.

Category C

1. Cal-Am shall monitor the design, engineering, and permitting of all elements of the Desalination Project, and report on such monitoring to the Governance Committee as described in Section VI. The Governance Committee shall discuss Cal-Am's report and may issue recommendations to Cal-Am pertaining to the Desalination Project;

2. Prior to Cal-Am's commencement of negotiations with a selected contractor relating to a Contract, the Governance Committee may review and issue recommendations concerning contract terms relating to such Contract;

3. The Governance Committee may review and issue recommendations concerning the preparation and quarterly update of an overall construction budget for the Desalination Project;

4. The Governance Committee may review and issue recommendations concerning a plan for acceptance testing, including follow-up reporting, for the Desalination Project;

5. The Governance Committee may annually review and issue recommendations concerning the Desalination Project operations and maintenance budget and rate impacts;

6. The Governance Committee may review and issue recommendations to Cal-Am with respect to local and regional permit requirements; and

7. The Governance Committee may review and issue recommendations concerning the preparation of quarterly progress reports during major design milestones (i.e., 30% design, 60% design, 90% design, and final design) and information on any material challenges to the Project design.

E. Additional Matters. If agreed unanimously by all members of the Governance Committee, including Cal-Am, additional matters not provided for herein may be added to Category A for decision or recommendation by the Governance Committee or to Category B for recommendation from the Governance Committee. Additional matters may also be added to Category C for recommendation from the Governance Committee upon affirmative vote of the Governance Committee unless Cal-Am determines that the addition of the matter to Category C would unreasonably delay the Project or otherwise compromise the public interest. If Cal-Am determines that a matter affirmed by the Governance Committee for addition to Category C should not be so added, Cal-Am shall issue a written explanation to the Governance Committee within ten (10) calendar days following the Governance Committee's vote to add the matter to Category C that explains the reasons supporting Cal-Am's determination.

VI. Meetings and Action of the Governance Committee; Agendas and Minutes

A. Meetings. Governance Committee meetings shall be conducted in compliance with the Ralph M. Brown Act (Government Code sections 54950, et seq.). The first meeting of the Governance Committee shall be scheduled by the primary representative of the MPWMD, and that representative shall preside over the first meeting at which a Chair and Vice-Chair shall be selected. Thereafter, the Chair, or in his or her absence, the Vice-Chair, shall schedule and preside over all meetings of the Governance Committee. During the pre-construction and construction phases of the Desalination Project, regular meetings of the Governance Committee shall be scheduled by the Chair, or in his or her absence, the Vice-Chair, and held on a monthly basis. During the operational phase of the Desalination Project, regular meetings of the Governance Committee shall be scheduled by the Chair, or in his or her absence, the Vice-Chair, and held on a quarterly basis for the first two years of the Desalination Project's operation and semi-annually thereafter. Special meetings of the Governance Committee, including for purposes of responding to a Cal-Am Notification, may be called by the Chair, or in his or her absence, the Vice-Chair, or by any member of the Governance Committee upon request of the Chair, or in his or her absence, the Vice-Chair.

B. Action by the Governance Committee. All decisions and recommendations of the Governance Committee issued to Cal-Am shall be in writing, signed by the Chair or Vice-Chair. All other actions of the Governance Committee shall be by motion recorded in written minutes.

C. Agendas, Correspondence, and Minutes. Agendas, correspondence, and minutes of the meetings of the Governance Committee shall be taken, maintained, and distributed by a designated staff member of the MPWMD.

VII. Quorum and Affirmative Action of the Governance Committee

To constitute a quorum at all meetings of the Governance Committee for the transaction of business, the primary or alternate elected official representative of at least three of the Parties must be present, in person. Action by the Governance Committee shall require the affirmative vote of at least two of the three Public Entity Members of the Governance Committee.

VIII. Submission of Project Information to the Governance Committee; Project Inspections

Concurrent with Cal-Am's submission of any documents concerning the Project to the CPUC, Cal-Am shall provide a copy of the documents (in paper or electronic form) to the Chair of the Governance Committee. The Chair may notice a meeting on his or her own initiative, or upon the request of any member of the Governance Committee, to review any financial matter addressed by the documents. Cal-Am, upon request of the Chair of the Governance Committee, shall be afforded an opportunity to provide a presentation or any oral explanation relating to the noticed financial matter. Further, upon reasonable advanced, written notice and subject to safety and security concerns and precautions as determined in good faith by Cal-Am, any member(s) of the Governance Committee may inspect any physical facility or structure constructed or being constructed as an element of the Desalination Project, and Cal-Am shall provide an employee, consultant, or other representative, who is knowledgeable of the aspects and elements of the physical facility or structure, to accompany the member(s) of the Governance Committee during the inspection.

IX. Term and Termination of Agreement

This Agreement shall continue in effect until the earlier of (1) the date that is forty (40) years after the effective date of this Agreement (March 8, 2053), or (2) the date that Cal-Am ceases to operate the Desalination Project, the earlier such date to be known as the "Expiration Date." Further, this Agreement may be terminated, prior to the Expiration Date, as follows: (1) by Cal-Am, following the issuance of an order from the CPUC ordering Cal-Am not to participate in this Agreement, as provided for in Section I above; (2) by Cal-Am, if the CPUC denies or rescinds Application A.12-04-019 or denies Cal-Am's development of, or subsequently rescinds Cal-Am's authority to develop, the Desalination Project; or (3) by the written agreement of no less than three of the four members of the Governance Committee. If, on September 8, 2052, the Desalination Project is still being operated by Cal-Am, the Parties shall, within thirty days thereafter, meet and commence negotiations in good faith to seek a renewal of this Agreement, upon mutually acceptable terms, to provide continued public oversight and input concerning the operation, maintenance, repair, modification, and/or replacement of the Desalination Project after the Expiration Date. If this Agreement is terminated by Cal-Am as a result of a CPUC order denying or rescinding Application A.12-04-019 or Cal-Am's authority to develop the Desalination Project, but Cal-Am intends to seek CPUC approval to develop a substitute project to provide water supplies for its Monterey District, then the Parties shall meet and negotiate in good faith to seek agreement, upon mutually acceptable terms, for a substitute agreement to provide public oversight and input concerning the design, permitting, construction, operation, maintenance, repair, modification, and/or replacement of such substitute project.

X. Miscellaneous

A. Further Assurances. The Parties shall execute such further documents and do any and all such further things as may be necessary to implement and carry out the intent of this Agreement.

B. Construction. The provisions of this Agreement shall be liberally construed to effectuate its purposes. The language of this Agreement shall be construed simply according to its plain meaning and shall not be construed for or against any Party, as each Party has participated in the drafting of this Agreement and had the opportunity to have their counsel review it.

C. Choice of Law. This Agreement shall be governed and construed under the laws of the State of California, with venue proper only in Monterey County.

D. Severability. If any term or provision of this Agreement is determined to be illegal, unenforceable, or invalid in whole or in part for any reason, such illegal, unenforceable, or invalid provision or part thereof, shall be stricken from this Agreement, and such provision shall not affect the legality, enforceability, or validity of the remainder of this Agreement. If any provision or part of this Agreement is stricken in accordance with the provisions of this section, then the stricken provision shall be replaced, to the extent possible and as agreed to by the Parties, with a legal, enforceable and valid provision that is as similar in content to the stricken provision as is legally possible.

E. Dispute Resolution. If a dispute arises between two or more of the Parties relating to this Agreement, or the rights and obligations arising therefrom, and if the Parties in dispute are unable to resolve the controversy through informal means, the Parties in dispute may, upon mutual agreement, submit the dispute to mediation, upon terms mutually agreed to by the Parties in dispute. Any Party not in dispute as to the disputed matter shall be afforded an opportunity to participate in the mediation. In addition, if the Parties in dispute are unable to resolve the controversy through mediation, the Parties in dispute may, upon mutual agreement, submit the dispute to binding arbitration, upon terms mutually agreed to by the Parties in dispute. Any Party not in dispute as to the disputed matter may, upon the mutual agreement of the Parties in dispute, be invited to participate in any binding arbitration.

F. Members to Bear their Own Costs. Each Party shall bear its own costs relating to the rights and obligations of each Party arising from this Agreement and its participation in the Governance

Committee and, therefore, no Party shall be entitled to any reimbursement from another Party as a result of any provision of this Agreement.

G. Notices and Communication. Any notice or communication hereunder shall be deemed sufficient if given by one Party to another Party or Parties, as appropriate, in writing and either (1) delivered in person, (2) transmitted by electronic mail and acknowledgment of receipt is made by the receiving Party(ies), (3) deposited in the United States mail in a sealed envelope, certified and with postage and postal charges prepaid, or (4) delivered by a nationally-recognized overnight delivery courier service, and addressed as follows:

If to Cal-Am:

California-American Water Company
Attn: Robert MacLean
President
1033 B Avenue, Suite 200
Coronado, CA 92118
Email: robert.maclean@amwater.com

with a copy to:

California-American Water Company
Attn: Anthony Cerasuolo
Vice President - Legal
1033 B Avenue, Suite 200
Coronado, CA 92118
Email: acerasuolo@amwater.com

If to the MPRWA:

Monterey Peninsula Regional Water Authority
Attn: Lesley Milton
Clerk
City of Monterey
351 Madison St. Monterey, CA 93940
milton@monterey.org

with copies to:

Monterey Peninsula Regional Water Authority
Attn: Donald Freeman
General Counsel
West Side of San Carlos & 8th
P.O. Box 805
Carmel, CA 93921
cityatty@ix.netcom.com

Monterey Peninsula Regional Water Authority
Attn: Russell McGlothlin
Special Counsel
21 E. Carrillo St.,
Santa Barbara, CA 93101
rmcglothlin@bhfs.com

If to the MPWMD:

Monterey Peninsula Water Management District
Attn: David J. Stoldt
General Manager
5 Harris Court – Bldg G
Monterey, CA 93940
Email: dstoldt@mpwmd.net

with a copy to:

Monterey Peninsula Water Management District
Attn: David C. Laredo

General Counsel
5 Harris Court – Bldg G
Monterey, CA 93940
dave@laredolaw.net

If to the County: County of Monterey Board of Supervisors
C/O Clerk of the Board of Supervisors
168 West Alisal Street
1st Floor
Salinas, CA, 93901
112-clerkoftheboardeveryone@co.monterey.ca.us

with a copy to: Monterey County Counsel
Attn: Charles J. McKee
168 West Alisal Street
3rd Floor
Salinas, CA 93901
mckeecj@co.monterey.ca.us

or to such other address or to such other person as each Party shall have last designated for receipt of notices pursuant to this Agreement. Where this Agreement provides for written notices or communication from Cal-Am to the Governance Committee, such written notice, explanation, or communication shall be directed to the Chair of the Governance Committee at the address set forth above for notices to the public entity from which the Chair is appointed, and when provided shall be deemed provided to all Public Entity Members of the Governance Committee. The effective date of any written notice, explanation, or communication shall be the earlier of the date of actual receipt, acknowledgment of receipt, or three days following deposit in the United States mail.

H. Successors and Assigns. This Agreement shall be binding on and shall inure to the benefit of the Parties and their respective legal representatives, successors, and assigns.

I. No Third Party Rights. Nothing in this Agreement, whether express or implied, is intended to confer any rights or remedies under or by reason of this Agreement on any persons other than the Parties to this Agreement and their respective successors and assigns, nor shall any provision in this Agreement give any third persons any right of subrogation or action over or against any Party to this Agreement.

J. Signatures - Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The Parties authorize each other to detach and combine original signature pages and consolidate them into a single identical original. Any of such completely executed counterparts shall be sufficient proof of this Agreement.

K. Effective Date. This Agreement shall take effect on date first stated above.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first stated above.

[signature page follows]

California-American Water Company

By: [signature]
Robert MacLean,
President

Monterey Peninsula Regional Water Authority

By:____________________________
Chuck Della Sala
President

Agreed as to form:

By:____________________________
Donald Freeman
General Counsel

Monterey Peninsula Water Management District

By:____________________________
David Pendergrass
Chair

Agreed as to form:

By:____________________________
David Laredo
General Counsel

County of Monterey

By:____________________________
Fernando Armenta
Chair of the Board of Supervisors

Agreed as to form:

By:____________________________
Charles McKee
County Counsel

California-American Water Company

By: ______________________
Robert MacLean,
President

Monterey Peninsula Regional Water Authority

By: ______________________
Chuck Della Sala
President

Agreed as to form:

By: ______________________
Donald Freeman
General Counsel

Monterey Peninsula Water Management District

By: ______________________
David Pendergrass
Chair

Agreed as to form:

By: ______________________
David Laredo
General Counsel

County of Monterey

By: ______________________
Fernando Armenta
Chair of the Board of Supervisors

Agreed as to form:

By: ______________________
Charles McKee
County Counsel

California-American Water Company	By: ________________________ Robert MacLean, President
Monterey Peninsula Regional Water Authority	By: ________________________ Chuck Della Sala President Agreed as to form: By: ________________________ Donald Freeman General Counsel
Monterey Peninsula Water Management District	By: ________________________ David Pendergrass Chair Agreed as to form: By: ________________________ David Laredo General Counsel
County of Monterey	By: ________________________ Fernando Armenta Chair of the Board of Supervisors Agreed as to form: By: ________________________ Charles McKee County Counsel

California-American Water Company

By: ______________________
Robert MacLean,
President

Monterey Peninsula Regional Water Authority

By: ______________________
Chuck Della Sala
President

Agreed as to form:

By: ______________________
Donald Freeman
General Counsel

Monterey Peninsula Water Management District

By: ______________________
David Pendergrass
Chair

Agreed as to form:

By: ______________________
David Laredo
General Counsel

County of Monterey

By: ______________________
Fernando Armenta
Chair of the Board of Supervisors

Agreed as to form:

By: ______________________
Charles McKee
County Counsel

ATTACHMENT 5

Attachment 5 – Details for Svindland Rebuttal Testimony Question 33.

E92 fx Filtrate Forwarding Pump (First Pass)

	B	C	D	E	F	G	H	I
89								
90			**Reverse Osmosis Process**					
91								
92				**Filtrate Forwarding Pump (First Pass)**				
93				Summer Annual Flow (Applied-1st Pass)	12,415 afy	22.2 MGD	15,386 gpm	
94				Winter Annual Flow (Applied-1st Pass)	12,348 afy	22.0 MGD	15,302 gpm	
95				Lift	50 psi	116 ft		
96			Summer	561 hp	421 kw	4,416 hrs	1,857,822 kwh	$ 186,340
97			Winter	558 hp	418 kw	4,344 hrs	1,817,623 kwh	$ 140,121
98								
99				**High Pressure Pump (First Pass)**				
100				Summer Annual Permeate Production (1st Pass)	5,587 afy	10.0 MGD	6,924 gpm	
101				Winter Annual Permeate Production (1st Pass)	5,556 afy	9.9 MGD	6,886 gpm	
102				Lift	970 psi	2,125 ft		
103			Summer	4,645 hp	3,483 kw	4,416 hrs	15,382,763 kwh	$ 1,542,891
104			Winter	4,619 hp	3,465 kw	4,344 hrs	15,049,918 kwh	$ 1,160,198

Cell References for Steps 1 through 8

	F	G	H
32			
33	PG&E Average Power Rates		
34	**Facility**	**Summer**	**Winter**
35	Feedwater Wells	$ 0.10030	$ 0.07709
36	River Intake PS	$ 0.10030	$ 0.07709
37	Desal Plant / DWPS	$ 0.10030	$ 0.07709
38			
39	ASR PS	$ 0.157	$ 0.110
40	ASR Wells	$ 0.113	$ 0.102
41			
42	Valley Greens PS	$ 0.157	$ 0.110
43	Seaside Wells	$ 0.157	$ 0.110
44	Segunda PS	$ 0.157	$ 0.110

Cell References for Power Cost in Step 7