MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

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SUPPLEMENT TO 10/17/05 MPWMD BOARD PACKET

Attached are copies of letters received between September 3, 2005 and October 5, 2005. These letters are also listed in the October 17, 2005 Board packet under item 14, Letters Received.

Author	Addressee	Date	Topic
Joe Rosa	MPWMD Board	9/7/05	Henrietta Stern and contacts with staff of the MPWMD (Also attached is David Berger' s reply of 9/23/05)
Monica Hunter	MPWMD Board	9/7/05	Comments on the Water Supply Strategy for the Monterey Peninsula
Victoria A. Whitney	Steven Leonard	9/13/05	SWRCB Order 95-10, 3rd Quarterly Report for Water Year October 1, 2004 through September 30, 2005, 262.0 (27-10), Carmel River in Monterey County
Roger K. Masuda	David Berger	9/16/05	Comparative Matrix of Water Supply Alternatives
Roger K. Masuda	David Berger	9/28/05	Determining the Optimum Water Resources Mix – Next Steps

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PAJARO / SUNNY MESA
COMMUNITY SERVICES DISTRICT
136 San Juan Road, Watsonville, Ca 95076
(831) 722-1389 • Fax (831) 722-2137

September 7, 2005

To: Board of Directors
MPWMD

FROM: Joseph Rosa, General Manager
Pajaro/Sunny Mesa Community Services District

RE: Henrietta Stern and contacts with staff of the MPWMD

Dear Board Members:

I wish to take this opportunity to commend and thank Ms. Henrietta Stern for her professionalism and her kind assistance that she provided prior to and during the recent public information session that was conducted at the Embassy Suites Hotel. I have been advised that she was most accommodating in securing information for the update of the "MATRIX" as well. As a manager, I know how much I appreciate receiving favorable information about the conduct and performance of my employees, and I hope that this information is helpful to you for future personnel considerations.

As you know, there has been virtually no contact between your management and our agency for months. Given their close working relationship with Cal-Am, we accept this. We do hope, however, that you are keeping abreast of our progress from newspaper accounts. Nonetheless, should your Board desire more information beyond a yearly update, we will be happy to provide your Board with such information as you may request.

Sincerely,

Joe Rosa

Joe Rosa,

MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

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September 23, 2005

Mr. Joe Rosa
General Manager
Pajaro/Sunny Mesa Community Services District
136 San Juan Road
Watsonville, CA 95076

Dear Joe,

I am writing to acknowledge receipt of your September 7, 2005 memo to the MPWMD Board of Directors commending Henrietta Stern for her recent work in obtaining updated information from your representatives for the MPWMD Long-term Water Supply Alternatives comparison matrix. Copies of your memo have been distributed to the MPWMD Chair and Board members.

I appreciate your positive feedback concerning Ms. Stern. Her efforts in obtaining and compiling updated matrix information from you and other project proponents were indeed outstanding. However, I was taken aback by the unfounded criticism in your memo to our Board that MPWMD management has made virtually no effort to contact your agency regarding the progress on your desalination project. Frankly, as you well know, exactly the opposite is true. The facts are as follows: Ms. Stern sent you a June 29, 2005 letter requesting that you call her to discuss our invitation that your District submit updated information on its proposed desalination project for the comparison matrix and to make a presentation on the project during the August 25 Town Hall meeting. Having received no response to her memo from you, Mr. Del Piero or any other representative of your District, Ms. Stern placed follow-up calls to you and Mr. Del Piero in July, but received no response to the messages she left. With our internal deadline to finalize preparations for the Town Hall meeting rapidly approaching, Ms. Stern asked me to call you in late July. When I made that call to you around July 25, your secretary advised me you weren't in, but that she would be sure to give you my message when you returned to the office later that day. I never received a return call from you.

Candidly, Joe, I had no intention of sharing with the MPWMD Board or anyone else your lack of professional courtesy in failing to respond to repeated contacts from Ms. Stern and me on the subject of your District's proposed desal project. Unfortunately, your unwise decision to communicate this false accusation directly to the MPWMD Board left me no choice but to set the record straight. If you'd like to discuss this or any other subject feel free to phone me at 658-5650. I always return my calls.

Sincerely,

David A. Berger AMT

David A. Berger
General Manager

pc: MPWMD Board of Directors
Henrietta Stern

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Arlene Tavani

-----Original Message-----
From: Monica Hunter [mailto:mhunter@pcl.org]
Sent: Wednesday, September 07, 2005 11:32 AM
To: Henrietta Stern
Cc: David Berger; Joe Oliver; Andy Bell; Darby Fuerst; Gary Patton; Mindy McIntyre; Monica Hunter
Subject: Comments on the Water Supply Strategy for the Monterey Peninsula

September 8, 2005

Monterey Peninsula Water Management District
Board of Directors
Re: MPWMD support of Monterey area proposed water projects

Dear Board Members,

This letter and attached information is submitted on behalf of the Planning and Conservation League Foundation (PCLF) to provide comment on the water supply strategy proposed for the Monterey Peninsula. The Planning and Conservation League Foundation is dedicated to planning and natural resource conservation, air and water quality, environmental justice, and sustainable energy.

PCLF is actively working to restore Monterey Peninsula's unique and highly productive Carmel River Watershed. Our work thus far has focused on Carmel River restoration that will help the area comply with State Water Resources Control Board order 95-10, the state and federal endangered species act, as well as existing public safety issues concerning San Clemente Dam as determined by the Department of Dam Safety .

While there are many challenges facing the Monterey Peninsula, the number of projects presented at the MPWMD's Town Hall meeting on August 25th demonstrates that there are many opportunities to address water supply challenges. PCLF supports implementation of solutions that will address water supplies needs, restore the Carmel River, and avoid impacts to other Peninsula environmental resources.

Several of the proposed projects for the Monterey Peninsula rely on development of seawater desalination. Please see attached documents with comments submitted to the California Public Utilities Commission on the Proponents Environmental Assessment (PEA) Final Report for the Coastal Water Project that identifies several issues with desalination in the Monterey Peninsula. PCLF's comments support implementation of environmentally acceptable beach well desalination, while identifying several problems with the development of unscreened open ocean desalination. I ask that you review and consider these comments as you decide how to direct your leadership on this issue.

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I would urge the Board to ensure that each ocean water desalination project proposal includes a full study of beach well intakes and that all proposals to meet water challenges in the Peninsula allow for restoration of the Carmel River without redirected impacts to the marine environment.

I would like thank the Board for your leadership in initiating public dialogue and participation on these important issues. Please contact either Monica Hunter or Mindy McIntyre if you have any questions about the information in this letter or about the attached comments.

Thank you,
Monica Hunter, Central Coast Project Manager
Mindy McIntyre, Water Policy Specialist
Planning and Conservation League Foundation

attachments:
PCLF Comments to the PUC regarding the Coastal Water Project (8/8/05)
CalAm PEA comments Attachment 3
PDF: Is a Beachwell Intake the Right Choice for Your Seawater Desalination Plant
Photo Presentation 1
Photo Presentation 2
Photo Presentation 3
Photo Presentation 4

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August 8, 2005

Andrew Barnsdale, Public Contact
California Public Utilities
505 Van Ness Avenue
San Francisco, CA 94102
415.703.3221

Re: Comments on the Proponent's Environmental Assessment (PEA) prepared by California American Water (Cal Am) for the proposed Coastal Water Project, Proceeding A.04-09-019

This letter transmits the comments of the Planning and Conservation League on the Proponent's Environmental Assessment (PEA) prepared by California American Water (Cal Am) for the proposed Coastal Water Project, Proceeding A.04-09-019. These comments are provided for your consideration as you exercise your independent responsibility to determine what will be in the CPUC's Environmental Impact Report including identification of the preferred alternative.

The Planning and Conservation League (PCL) is an environmental advocacy organization with thousands of members throughout California. PCL focuses on issues of statewide significance. Over our forty year history, PCL has become a recognized advocate for good water management in California.

PCL also has pertinent expertise regarding this project and desalination. While a member of the State Assembly our past Executive Director, Fred Keeley, authored Assembly Bill 1182 (Chapter 797, Statutes of 1998) which required the CPUC to develop the Plan B project.

These comments were developed with input from Jonas Minton, PCL's Water Policy Advisor. From 2000 to 2004 Mr. Minton was Deputy Director of the State Department of Water Resources where he chaired the State Desalination Task Force called for under Assembly Bill 2717 (Chapter 957, Statutes of 2002). In 2005 he was asked to serve on DWR's review committee for desalination grants under Proposition 50. Also in 2005 he was invited by the California Coastal Commission to brief them on desalination issues relevant to their responsibilities.

Our comments on this PEA are consistent with the findings and recommendations of the October, 2003 State Water Desalination Task Force and the Coastal Commission's March

2004 report, "Seawater Desalination and the California Coastal Act" which we incorporate by reference.

1. The appropriate objective for the project should be limited to 10,730 acre feet of water plus the amount of overdraft of the Seaside groundwater aquifer that is independently confirmed. Under State Water Resources Control Board order 95-10 Cal Am is required to stop pumping 10,730 acre feet of water from wells adjacent to, and connected to the Carmel River.

   Implementation of this project should be contingent on explicit assurances that water produced from this project will replace water now being pumped from the Carmel River and that implementation of the project will result in full compliance with State Water Control Board order 95-10.

   If in fact the Seaside aquifer is being over drafted on a long term basis, that amount of overdraft could be added to the capacity of the project. However it is necessary that the amount of any long term overdraft be independently verified. In addition there need to be enforceable assurances that such water will be used for eliminating overdraft and not used for additional development, leaving the overdraft uncorrected.

2. All alternatives incorporated into the EIR for this project should include analysis of full implementation of water conservation, water recycling and groundwater treatment on the Monterey Peninsula. Alternatives that include desalination should only be included if it is determined that conservation, recycling and groundwater treatment cannot replace the 10,730 acre feet of supply that needs to be returned to the Carmel River. Water conservation, water recycling and groundwater treatment are more cost-effective alternatives to meet water demands than seawater desalination. In order to minimize costs for the rate payers on the Monterey Peninsula these options should be fully implemented prior to implementation of expensive desalination.

3. In the PEA, both Alternative 1, the Regional Alternative, and Alternative 2, the Oversized Pipeline, would inappropriately exceed the project purpose. They would be inconsistent with Coastal Commission policy and they would impose additional and unnecessary costs on existing ratepayers.

   Because Alternatives 1 and 2 would allow significant unplanned growth affecting the coastal zone these alternatives would violate Coastal Commission policies. Section 3025(a) of the Coastal Act states in part, "New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, individually or cumulatively, on coastal resources ..."

The Coastal commission's report, "Seawater Desalination and the California Coastal Act," at page 56 drew specific attention to this project,

"For proposals meant to augment existing supplies, project review should determine whether growth related to the increased availability of water would occur within allowable limits or projections identified in Local Coastal Programs or other local and regional planning efforts. An example of how these reviews may differ is the desalination facility currently being considered at the Moss Landing Power Plant on Monterey Bay. The primary proposal would provide just enough water to replace some currently being withdrawn form the Carmel River. An alternative proposal being considered would have the facility provide much more water to serve areas of Monterey County not currently within the service district. These two proposals will undergo very different evaluations to determine their growth-inducing impacts."

The additional amount of water included in Alternative 1 would allow on the order of an additional 100,000 residents. Alternative 2 would include distribution capacity that in the future could deliver the same amount of water to serve that increased population. We are not aware that the Local Coastal Programs or the Monterey General Plan include assurances that services for that additional population will be available to avoid impacts on coastal resources.

That is particularly important because any seawater desalination plant will require Coastal Commission approval. It would not make sense for the CPUC to approve a project that could not be permitted by the Coastal Commission.

4. The CPUC's Environmental Impact Report needs to address the impacts to the Monterey Bay National Marine Sanctuary from a desalination plant at Moss Landing apart from the impacts of Duke Energy. If some or all of the power plant cooling system at the Duke Energy site is not operated in the future, the desalination facility would require perpetuation of the impacts of the intake system on the Marine Sanctuary. This is especially relevant considering that the Duke Power plant is up for renewal of intake operational permits and it is not known whether all existing generation units or cooling processes will be continued.

New technologies exist for cooling power plants that do not require large scale seawater intake. These new technologies would not be compatible for operation and co-location of a desalination facility. It is reasonable and foreseeable that Duke Energy would be required by the U.S. EPA under requirements of the 316 (b) permit to retrofit the Moss Landing Duke Energy facility with these new less harmful technologies. In such a case, Alternative 1 and 2 in the PEA would require a separate intake or continued operation of the out-dated and harmful cooling water intake. In both scenarios, the impacts of the desalination facility are completely separate from the impacts of the power plant.

In addition, operation of the desalination facility could complicate and delay the retrofitting of the power plant. This would perpetuate the use of an outdated system and the significantly damaging impact on the Monterey Bay Marine Sanctuary, including impacts on endangered species such as the Southern Sea otter.

The State Desalination Task force specifically recommended of that a separate analysis of impacts, stating: "For proposed desalination facilities co-locating with power plants, analyze the impacts of desalination facility operations apart from the operations of the co-located facilities. This will identify the impacts of the desalination facility operations when there are reductions in cooling water quantities."

5. Alternative 3, the North Marina Site, is the financially, environmentally and regulatorily preferred alternative. Unlike the Moss Landing Site, the Marina location would allow use of beach well intakes, perhaps supplemented by horizontal directionally drilled intakes.

Such technology has been proven at that very site. Since 1995 the Marina Coast Water District has operated a desalination plant using a beach well intake next to that location. They report that it entirely avoids entrapment and entrainment of marine life.

In addition, the City of Long Beach Water Department (LBWD) is in the process of piloting a beach well desalination facility and has thus far had great success. The beach well and desalination process in LBWD has proven to avoid marine impacts and provide higher quality water than desalination facilities with ocean open intakes, including those co-located with power plants. LBWD is now pursuing a larger scale facility. Attachment 1 shows the proposed location of beach well intakes for the demonstration facility, and Attachment 2 shows the proposed location of full-scale the full scale facility in Long Beach.

As demonstrated by Attachment 2, beach well intakes for a full scale facility in Long Beach are feasible sue to the ample beach area. Marina State Beach has more than enough beach area to accommodate intakes similar to those in Long Beach.

In addition beach well intakes provide excellent filtration of organic and inorganic materials that could foul the desalination membranes. This can reduce project costs for both filter and membrane replacement, as well as reduce the need and cost for intake pretreatment.

Beach well filtration also removes a tremendous risk to the ratepayers. In Tampa Bay, Florida a large desalination plant sits largely idle because of membrane fouling due to inadequate filtration and clogging of the membrane by marine organisms. Despite the fact that desalination plant cannot provide a reliable water supply, South Florida residents are still required to pay for the expensive facility (see Attachment 3).

Even if the proponent claims that the filtration process will remove currently known organisms, there is no guarantee that new invasive species would be removed. With the proliferation of exotic species from ship bilges, ocean water temperature changes, etc. it is quite possible there will be changes in the mix of marine species. In fact, the most problematic issue for Tampa Bay has been clogging of the filter by invasive Asian green clams. It would be a multi-faceted failure if a Moss Landing desalination plant fouled, the ratepayers had to pay it off, and then they would have to pay again for a workable alternative such as water conservation and recycling.

Furthermore beach well intakes avoid intake impacts to marine species. This is consistent with Recommendation 8 of the State Desalination Task Force, "Ensure seawater desalination projects are designed and operated to avoid, reduce, or minimize impingement, entrainment, brine discharge and other environmental impacts."

This is particularly important as any of the desalination alternatives will take water from the Monterey Bay National Marine Sanctuary, the largest sanctuary in the United States. The Monterey Bay National Marine Sanctuary's natural resources include the nation's largest kelp forest, one of North America's largest underwater canyons and the closest-to-shore deep ocean environment in the continental United States. It is also home to vulnerable endangered species, such as the Southern Sea Otter. In order to be feasible, the final preferred alternative for this project will need to minimize and avoid impacts to the Monterey Bay Sanctuary to the maximum extent possible.

A beach well alternative at Marina would also be consistent be with the recommendation of the Coastal Commission report, "Applicants are encouraged to use subsurface intakes whenever feasible, and where they will not cause significant adverse impacts to either beach topography or groundwater supplies,"("Seawater Desalination and the California Coastal Act," at page 13). Again, compliance with their recommendation is particularly important as Coastal Commission approval is necessary for any ocean desalination project.

The engineering feasibility of a beach well facility on the scale of the proposed project has been demonstrated by three operating plants in Malta. Beach well engineering feasibility is also described in the attached article, "Is a beach well intake the right choice for your seawater desalination plant?" (Attachment 4).

It is worth noting that the potential visual impact described in that article can be avoided, as demonstrated by Marina's Coast Water District's existing beach well (refer to Attachment 5) and with Long Beach's planned facility (refer to Attachment 2). The land on which Marina Coast Water District's beach well is located is owned by the California Department of Parks and Recreation. Marina Coast Water District was readily able to comply with Parks' requirement that the well be invisible to beach users. (See Attachment 4 demonstrating the total lack of visual impact of the existing beach well intake.)

In addition it is important to note that there is more than enough beach area available and already under public ownership to accommodate beach well intakes necessary for an appropriately sized facility for the project proposed in the PEA. There are literally miles of beach immediately down the coast from the Marina Coast Water District's existing, proven site. (See Attachment 5)

This land is also owned by the State Department of Parks and Recreation, a department within the State Resources Agency. Resources Agency Secretary Mike Chrisman has expressed his desire to assist in resolution of issues associated with Water Board Order 95-10. It is reasonable to foresee State support for the use of that area to site unobtrusive beach wells

Lastly, the Marina Site is also much closer to Cal Am's service area than the Moss Landing location. This would significantly reduce costs born by the ratepayers for the pipeline to Cal Am's service area.

Large scale desalination has never been successfully achieved in California or the Untied States. If the project before you is approved, it will be one of the first desalination facilities in California to provide a significant portion of drinking water to area residents. We ask for your careful and thorough consideration of the issues identified in the above comments and the comments submitted by other parties as you decide on this potentially precedent settling proposal. If you have any questions or would like additional information about these comments please contact me at (916) 313-4518 or mmcnityre@pcl.org.

Mindy McIntyre
Water policy Specialist

CC:
Andrew Bell, Monterey Peninsula Water Management District
Meg Caldwell, California Coastal Commission
Peter Douglas, California Coastal Commission
Al Wanger, California Coastal Commission
John Laird, California State Assembly Member
Susan Kennedy, California Public Utilities Commission
Michelle Cook, California Public Utilities Commission

IS A BEACH WELL INTAKE THE RIGHT CHOICE FOR YOUR SEAWATER DESALINATION PLANT?

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The recent worldwide trend towards development of large seawater desalination plants in highly urbanized coastal areas worldwide brings in the limelight the need for selecting seawater plant seawater intake type and configuration that allow to produce desalinated water at minimum cost and impact on the environment. The intake is one of the key components of every membrane seawater desalination plant. The purpose of the seawater intake is to ensure adequate and consistent flow and quality of source water over the entire useful life of the desalination plant. The two key types of intakes used for seawater reverse osmosis desalination plants are beach wells (subsurface intakes) and open surface intakes.

Beach wells are typically located on the seashore, in a close proximity to the ocean. This type of intake is relatively simple to build and the seawater the wells collect is pretreated via slow filtration through the subsurface seabed formations in the area of source water extraction. Therefore, source seawater collected using beach well intakes is usually of better quality in terms of solids, slit, oil & grease, natural organic contamination and aquatic microorganisms, as compared to open seawater intakes. Sometimes, beach well intakes may also yield source water of lower salinity.

Beach wells could be either vertical or horizontal. The most widely used type of horizontal collector beach wells are often referred to as Ranney wells. The vertical beach wells are usually less costly than the horizontal wells but their yield is relatively small (typically, 400 to 4,000 m^3/day (0.1 to 1.0 MGD)) and therefore, the use of vertical wells for large plants is typically less favorable and practical.

Open surface intakes for large seawater desalination plants are often complex structures including intake piping which typically extends several hundred to several thousand meters into the ocean. Seawater collected through open intakes usually requires pretreatment prior to reverse osmosis desalination. The cost and time for construction of a new open surface ocean intake could be significant and could reach 10 to 20 percent of the overall desalination plant construction cost. New open ocean intakes could potentially entrain more aquatic organisms than beach wells because they take raw seawater directly from the ocean rather than source water pre-filtered through the coastal sand formations.

Although beach wells have proven to be quite cost-competitive for plants of capacity smaller than 4,000 m^3/day (1 MGD), open surface ocean intakes have found significantly wider use for large seawater reverse osmosis (SWRO) desalination plants. At present, worldwide there are only four operational SWRO facilities with capacity larger than 20,000 m^3/day (5.3 MGD) using beach well intakes. The largest SWRO facility with beach wells is the 54,000 m^3/day (14.3 MGD) Pembroke plant in Malta. This plant has been in operation since 1991. The 42,000 m^3/day (11 MGD) Bay of Palma plant in Mallorca, Spain has 16 vertical wells with capacity of 5,600 m^3/day (1.5 MGD) each. The third largest plant is the 24,000 m^3/day (6.3 MGD) Ghar Lapsi SWRO in Malta. Source water for this facility is supplied by 15 vertical beach wells with unit capacity of 3,800 m^3/day (1.0 MGD).

The largest SWRO plant in North America which obtains source water from beach wells is the 15,000 m^3/day (3.8 MGD) water supply facility for the Pemex Salina Cruz refinery in Mexico. This plant also has the largest existing seawater intake wells – three Ranney-type radial collectors with capacity of 15,000 m^3/day (3.8 MGD), each.

There are a number of key factors that have to be taken into consideration when assessing the viability of using a beach well intake for a large desalination plant (facility with production capacity over 20,000 m^3/day (5.3 MGD)). These factors are discussed below.

Site Conditions

Site suitability for the construction of beach well intake is typically determined by the completion of a detailed hydrogeologic investigation. The factors that define to a great extend if the use of beach wells is practical or/and economical are: the transmissivity/productivity of the seashore geological formations; the thickness of the beach deposits; and the existence of nearby fresh water source aquifers, which could be negatively impacted by the beach well operations or could have a measurable effect on beach well water quality. The geological conditions that favor the construction of beach well intakes are permeable sand formations which transmissivity exceeds 1,000 m^3/day/m, and which depth extends to 15 meters (45 feet) or more.

Beaches of shallow bays that contain significant amount of mud/alluvial deposits and have limited natural flushing do not favor the use of beach wells for SWRO plant intakes. High content of fine solids in the bay seawater in combination with low frequency of bay flushing and low transmissivity of the beach deposits may render shallow bay beaches less desirable or unsuitable for construction of SWRO plant beach well intakes.

It is important to note that both beach wells and near shore open intakes use the same seawater as a source. In desalination plants with open intakes the solids contained in the source seawater are retained and removed by the desalination plant pretreatment filtration system. In desalination plants with beach well intakes, the same amount of solids is retained on the ocean floor in the area of well source water collection while the filtered water is slowly conveyed through the ocean floor and the beach subterrain formation until it reaches the well collectors. The wave action near the ocean floor is the force that allows the solids separated from the beach well source water to be dissipated in the ocean. If the bay area is not well flushed and the naturally occurring wave movement is inadequate to transport the solids away from the beach well collection area at a rate higher than the rate of solids deposition, than the solids naturally occurring in the seawater would begin to accumulate on the ocean floor and would ultimately reduce the well capacity and source water quality. Therefore, the feasibility assessment of beach well intake use should include not only a subsurface investigation of the source water aquifer but the flushing and solids dissipation capacity of the tidal action and currents in the vicinity of the beach well intake area.

Beach wells which area of influence/source water collection extends to a nearby fresh/brackish groundwater aquifer may have a negative impact on the aquifer capacity and water quality, and in some cases their operation may result in enhanced seawater intrusion. On the other hand, if a nearby fresh/brackish groundwater aquifer is contaminated with pollutants, which are typically not present in the seawater in a measurable quantity (such as fuel oil contaminants, endocrine disruptors, heavy metals, arsenic, septic tank leachate, etc.) than the SWRO plant may need to be provided with additional treatment and/or disposal facilities, which would erode the benefits of well intake use.

The fact that at present, worldwide only four out of over 50 existing large SWRO plants with production capacity over 20,000 m^3/day (5.3 MGD) use beach wells for source water supply indicates that finding the right combination of favorable site conditions for large-scale beach-well intakes is a challenging task. Therefore, their viability is very site-specific and has to be evaluated based on a thorough evaluation of a number of factors discussed below.

Seashore Impacts

Beach wells are typically located on the seashore, in a close vicinity (typically within hundred meters) of the ocean. Because of the high number of wells required to supply adequate amount of water for a large seawater desalination plant, construction of these facilities would result in disturbance of a significant amount of seashore land and natural habitat.

If the site-specific geological conditions allow, high-productivity horizontal (Ranney) beach wells, infiltration galleries or seabed filtration systems could be used to reduce the number of individual wells needed. These types of beach well intake systems would typically yield 8,000 m^3/day to 20,000 m^3/day (2.1 MGD to 5.3 MGD) of source water per individual well. Under a hypothetical best-case scenario, a 40,000 m^3/day (10.6 MGD) desalination plant (which requires 80,000 m^3/day (21.2 MGD) of intake flow) would necessitate the construction of a minimum of four operational and one standby beach wells of unit capacity of 20,000 m^3/day (5.3 MGD) each to collect adequate amount of source water. If horizontal beach wells, infiltration galleries or seabed filtration systems are used, the minimum distance between the individual wells would be 120 m (400 ft), and the footprint of the beach well impacted seashore area would be at least 30 m (100 ft) wide by 610 m (2,000 ft) long. Therefore, the minimum area of seashore impact as a result of construction of a beach well intake system for a 40,000 m^3/day (10.6 MGD) SWRO plant would be 30 m x 610 m = 18300 m^2 (100 ft x 2,000 ft = 200,000 sq ft (4.5 acres)). Figure 1 gives a general representation of the seashore area which would be impacted by the construction of a beach well intake system for a hypothetical 40,000 m^3/day (10.6 MGD) seawater desalination plant.

For comparison, construction of a new open ocean intake would have significantly smaller area of impact on the beach shore. For a 40,000 m^3/day (10.6 MGD) seawater desalination plant this beach area would be less than 2 acres. If the desalination plant is co-located with an existing power plant station, no additional intake structure would be required and therefore, the coastal beach zone and environment would not be disturbed with the installation of additional structures, equipment and associated service infrastructure (access roads, electrical supply equipment, etc.).

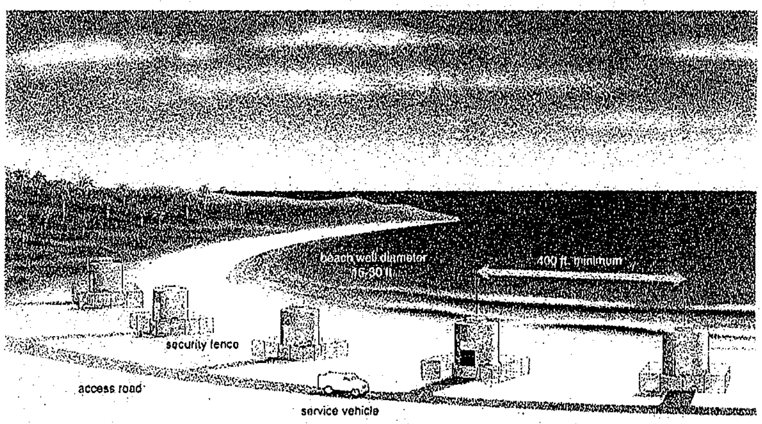


Figure 1 – Seashore Impact of Large Beach Well Intake System

Because of the significant size of the impacted seashore area, use of beach wells may result in another site-related implication, i.e. encountering artifacts of historical and archeological significance at the site designated for intake facilities. At many locations worldwide, the probability of discovering remains of ancient habitats along the seashore is much higher than further inland. This probability would increase with increasing the footprint of the disturbed seashore area.

Visual and Aesthetic Impacts

Beach intake well intake structures for large seawater desalination plants are often constructed as large-diameter caissons and are tall above-ground concrete structures that would have a visual and aesthetic impact on the shore line on which they are located. Typically, the pumps and service equipment conveying the water from a large-size beach well are located above the wet-well of the caisson. Taking under consideration that the beach wells are usually located in a close proximity of the ocean, the well intake pumps have to be installed at such an elevation that

assures the protection of the well intake pumps and associated auxiliary equipment from flooding. Therefore, the height of the structures of large intake wells with above-grade pump houses may exceed 3 m (10 feet) above the beach ground level (see Figure 2). Figure 2 shows one of the three 15,000 m^3/day (3.8 MGD) horizontal beach wells for the SWRO plant providing water supply for the Pemex Salina Cruz refinery in Mexico.

For smaller-size beach wells the caisson/vertical well collector can be build water-tight and can be located below grade to minimize visual impact. However, the size and servicing of the well pumps, piping, electrical, instrumentation and other auxiliary equipment of large-capacity wells usually dictates the location of their pump house to be above grade. Although the above-grade pump house could be designed in virtually any architectural stile, this facility and its service roads and controlled access provisions may result in a significant change in the visual landscape of the seashore.

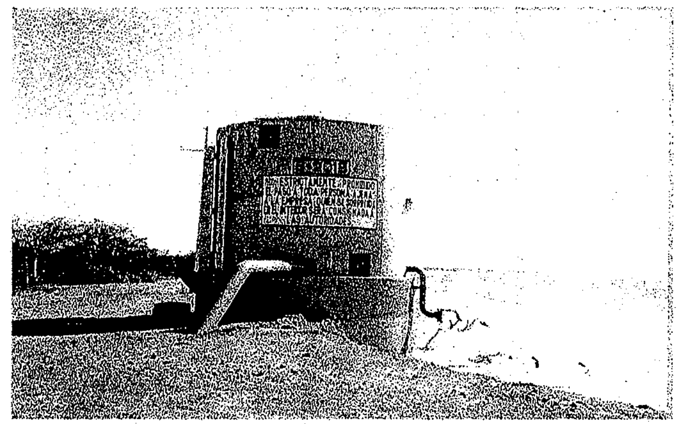


Figure 2 – Intake Beach Well of Large Seawater Desalination Plant

Taking under consideration that the desalination plant source water has to be protected, the individual beach wells would have to be fenced-off to prevent an unauthorized access. The large and tall fenced-off beach well concrete structures would have a limited visual and aesthetic appeal. Since beaches are visually sensitive areas, the installation of large beach wells may affect the recreational and tourism use and value of the seashore, and may change the beach appearance and character.

For comparison, open coastal intakes are typically lower-profile structures that may blend better with the coastal environment and its surroundings. If the desalination plant is co-located with an existing power plant, construction of new on-shore structures or facilities is typically not required and therefore, is more favorable in terms of additional negative visual and aesthetic impact on the coastal environment and landscape.

Beach Erosion

Beach erosion is an additional factor that can significantly impact the useful life of the intake wells. As seen on Figure 3, beach erosion in only several years of operation may result in a loss of soil support on the ocean side of the wells and associated service buildings (such as the intake pump station control room shown on the figure), which in turn could cause the wells to tilt towards the ocean and ultimately could compromise the structural integrity and performance of the well intake facilities. Therefore, beach erosion may shorten significantly the useful life of the beach wells and increase the overall life-cycle water cost if the well location is not properly selected. Beach erosion problems have been observed not only at the Salina Cruz wells shown on Figure 3, but on a number of other locations, worldwide.

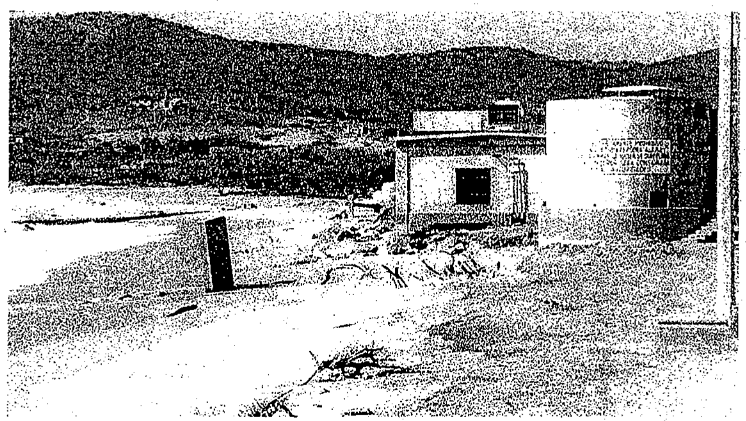


Figure 3 – Desalination Plant Intake Beach Well Erosion

Due to its significant potential impact on the intake system operation and costs, potential for beach erosion in the vicinity of the targeted intake well location has to be thoroughly evaluated and investigated. If the selected beach site has a high potential for erosion, than the beach wells have to be protected with anti-erosion facilities or build further inland beyond the area of high beach erosion impact.

Beach Well Useful Life and Life-Cycle Costs

The useful life of a well designed and operated seawater desalination plant is 25 to 30 years. Because the beach wells may often have a shorter useful life span than that of the desalination plant, in the worst-case scenario, two sets of beach wells may need to be constructed over the useful life of the SWRO plant. The need for replacement of some or all of the original beach wells after the first 10 to 20 years of the desalination plant operation would magnify the shoreline impacts of the beach wells and would increase the overall cost of water production. Therefore, the potential difference between the useful life of beach wells and open intakes has to be reflected in the life-cycle cost comparison associated with the selection of the most viable type of desalination plant intake.

Need for Source Water Pretreatment

As mentioned previously, beach wells typically yield better intake water quality than open seawater intakes in terms of seawater turbidity and silt density index, which are two of the key parameters associated with the selection, sizing and costs of the desalination plant pretreatment system. Therefore, often it is assumed that the use of beach wells would eliminate the need for seawater pretreatment prior to reverse osmosis desalination.

However, the existing experience with the use of beach wells for seawater desalination in California and at the largest beach-well seawater desalination plant on the West Coast in Salina Cruz, Mexico indicate that some desalination plants using beach wells may face a costly problem – high concentrations of manganese and/or iron in the intake water. Unless removed ahead of the reverse osmosis membrane system, iron and manganese may quickly foul the cartridge filters and SWRO membranes and render the desalination plant inoperable. The treatment of beach well water which naturally contains high concentrations of iron and/or manganese requires chemical conditioning and installation of conservatively designed "greensand" pretreatment filters ahead of the SWRO system. This costly pretreatment requirement may significantly reduce the benefits of the use of beach wells as compared to an open seawater intake. Open seawater intakes typically do not have iron and manganese source water quality related problems because open ocean water does not contain these compounds in significant quantities to cause RO treatment problems.

Example of beach well desalination plant which faced an elevated source water iron problem is the 4,500 m^3/day (1.2 MGD) Morro Bay SWRO facility located in Northern California, USA. The plant source water is supplied by five beach wells with a production capacity of 1,100 m^3/day to 1,900 m^3/day (0.3 to 0.5 MGD) each. The beach well intake water has iron concentration of 5 to 17 mg/L. For comparison, open intake seawater typically, has several orders of magnitude lower iron concentration.

The Morro Bay facility was originally designed without pretreatment filters, which resulted in plugging of the RO cartridge filters within half-an-hour of starting operations during an attempt to run the plant in 1996. The high-iron concentration problem was resolved by the installation of pretreatment filter designed for a loading rate of 6.1 m^3/ m^2.h (2.5 gpm/sq ft). For comparison, a typical open-intake desalination plant is designed for pretreatment loading rates of 10 to 13.5 $m^3/m^2.h$ (4.0 to 5.5 gpm/sf ft) – and, therefore would require less pretreatment filtration capacity. As indicated previously, the largest existing Pacific-coast seawater desalination plant in Salina Cruz, Mexico has also faced an iron and manganese problem, which was resolved by the installation of pretreatment filters and chemical conditioning of the beach well water. The existing experience shows that, the costs for a pretreatment of seawater with high iron/manganese content collected by a beach well intake are typically comparable or higher than these for pretreatment of seawater collected using an open-ocean intake.

Source Water Quality Variation

Open ocean intakes provide relatively consistent seawater quality in terms of total dissolved solids (TDS) concentration. The intake source water TDS concentration data collected for the development of the Huntington Beach seawater desalination project in Southern California, USA indicate that the open intake salinity varied within 10 percent of its average value of 33.5 ppt. Although in general beach wells produce source water of consistent salinity, they could also yield water of unpredictably variable TDS concentration with swings exceeding over 30 % of the average. For example, the TDS concentration of the two operational wells at the Salina Cruz water treatment plant vary in a wide range – for well No. 2 between 16.8 and 21.8 ppt, and for well No. 3 between 17.8 and 19.8 ppt. The wide range of source salinity concentration in this case is explained by fresh groundwater influence.

A similar trend was observed at the Moro Bay SWRO plant in California. During the plant's initial operation in 1992, the well water TDS was approximately 26,000 mg/L. In December 2001, the TDS of the intake water was 6,300 mg/L. The December 2002 data for the same plant indicate intake salinity of 22,000 mg/L.

The wide range of intake salinity in systems using beach wells over time would require the installation of variable frequency drives for efficient power use control, which would ultimately increase the construction cost of such system and complicate its operation.

One important issue to be taken under consideration when assessing the viability of using beach wells is the fact that the intake well salinity can change unpredictably over time when influenced by fresh water inflow to the aquifer. This uncertainty of intake water quality increases the risk of uncontrollable increase in unit cost of water production over time and has to be taken in consideration when comparing the overall life-cycle costs of the desalination plant operations. Therefore, the beach well intake water quality has to be thoroughly characterized by installing a set of test wells and collecting water quality samples under variety of operational conditions. Thorough year-around water quality characterization is of high importance for beach wells which source water may be influenced by fresh groundwater aquifers with seasonal fluctuation of water quality.

Watch Out for Difficult to Treat Contaminants

Usually open ocean intakes are considered less viable source of water for desalination plants in areas located in close proximity to wastewater discharges or industrial and port activities. However, the open intake seawater is typically free of endocrine-disruptor or carcinogenic type of compounds such as: MTBE, NDMA and 1,4-dioxane. Long-term water quality data collected for the development of the Huntington Beach and Carlsbad SWRO projects in Southern California and a number of other desalination plants worldwide, confirm this observation. Beach well water however, may contain difficult to treat compounds especially when they are under influence of contaminated groundwater. Example is the Morro Bay SWRO plant, where beach well intake water was contaminated by MTBE caused by contamination from an underground gasoline tank spill. MTBE is a gasoline additive. Similar problems were observed at the California's Santa Catalina Island 500 m^3/day (0.132 MGD) seawater desalination plant that uses beach well intake.

The compounds of concern could be treated by a number of available technologies, including activated carbon filtration, UV irradiation, hydrogen peroxide oxidation, ozonation, etc. However, because these treatment systems will need to be constructed in addition to the SWRO system, this additional treatment may increase the overall desalinated water production cost measurably.

Oxygen Concentration of Desalination Plant Discharge

Beach well water typically has a very low dissolved oxygen (DO) concentration. The DO concentration of this water is usually less than 2 mg/l and often it varies between 0.2 and 1.5 mg/L. The SWRO treatment process does not add an appreciable amount of DO to the intake water. Therefore, the SWRO system product water and concentrate have the same or lower DO concentration. The low DO concentration of the product water would require either product water reaeration or will result in significant use of chlorine.

If the low DO concentrate from a well intake desalination plant is to be discharged to an open water body – the ocean or a river, this discharge typically would not be in compliance with the United States Environmental Protection Agency's daily average and minimum DO concentration discharge requirements of 4 mg/L and 5 mg/L, respectively. Because large desalination plants using intake wells would discharge a significant volume of low-DO concentrate, this discharge could cause oxygen depletion and stress to aquatic life. Therefore, this beach well desalination plant concentrate has to be re-aerated before surface water discharge. For a large SWRO plant, the amount of air and energy to increase the DO concentration of the discharge from 1 mg/L to 4 mg/L is significant and would have a measurable effect on the potable water production costs. Discharge of this low DO concentrate to a wastewater treatment plant outfall would also result in a significant additional power use to aerate this concentrate prior to discharge. For comparison the concentrate from SWRO plants with open intakes would typically have DO concentration of 5 to 8 mg/L, which is adequate for disposal to the ocean, without re-aeration.

Summary and Conclusions

Beach wells are an attractive intake option for small seawater desalination plants. However, a number of their advantages over open ocean intakes typically diminish for desalination plants with capacity over 40,000 m^3/day (5.3 MGD). Large above-grade beach well intakes may have a measurable impact on the visual appearance and aesthetics of the coastal shoreline and environment. Uncertainties related to the productivity, useful life and intake water quality of large beach wells could significantly elevate the risk of uncontrollable increase in the cost of water production over the useful life of the desalination plant. Therefore, these factors have to be taken in consideration and studied thoroughly prior to selecting the most viable intake system for large membrane seawater desalination plants.

Attachment 3:

St. Petersburg Times ONLINE TAMPA BAY

Desal sparks war of words

Swiftmud wants Tampa Bay Water to use the plant full time. Tampa Bay Water says the plant is undergoing repairs.

By BILL VARIAN, Times Staff Writer
Published June 28, 2005

In a strongly worded opinion, attorneys for the region's water regulator say a new desalination plant in Apollo Beach was always expected to run at or near full strength, full time.

The governing board of the Southwest Florida Water Management District did not pledge $85-million in taxpayer money toward the plant's construction to see it used full bore chiefly in peak-demand periods, the letter argues.

However, that is how Tampa Bay Water plans to use it now. The result will be increased groundwater pumping in the near term, a reversal to the sharp cuts the water utility has achieved in recent years.

The opinion letter goes to the Swiftmud governing board when it meets today in Brooksville. Frank L. Hearne, a consulting attorney for Swiftmud who wrote the opinion, said the board has the right to determine whether Tampa Bay Water is in breach of its funding agreement.

His letter arms the board with the legal backing to do so, if it chooses.

"We're legitimately looking out for how those taxpayer dollars are spent," said Bill Bilenky, general counsel for Swiftmud, who worked closely with Hearne in crafting the opinion.

Tampa Bay Water supplies most of Pasco, Pinellas and Hillsborough counties' drinking water. Swiftmud is in charge of safeguarding the region's water resources.

Tampa Bay Water countered with its own opinion Monday, one that weighs in at nearly twice the length of the eight-page Swiftmud letter sent out Friday. It says, in short, that there's no reason for this issue to be raised now. The desal plant is undergoing fixes and won't be fully working until at least 2007, and Tampa Bay Water isn't looking for a check from Swiftmud before then.

"The conclusion that I reach, first of all, is it's puzzling why the district is raising the issue at this time," said the utility's general counsel Don Conn.

Most of Conn's letter argues that Swiftmud has no say-so over how Tampa Bay Water runs its shop on a day-to-day basis anyway. In that regard, it directly counters the Swiftmud letter, using some of the same written agreements to do so.

Tampa Bay Water is only obligated by Swiftmud to build a set amount of alternative water sources and to ultimately reduce pumping by 2007, the letter argues. The utility has exceeded its alternative supply requirements and is already close to its 2007 target pumping reductions as a result, said Tampa Bay Water general manager Jerry Maxwell.

"It's pretty amazing what we've accomplished here," Maxwell said. "I can't imagine having a dispute over the issues they've raised."

The dispute arose in recent months after Tampa Bay Water officials unveiled a budget planning tool to chart out what mix of water sources to use in the coming years. In explaining the computer modeling system, water officials revealed they plan to use the desal plant to produce an average of 15-million gallons daily in future years.

The desal plant was built with the expectation that it could produce 25-million gallons of drinkable water daily, though the fixes are needed to reach that amount. Its total cost is expected to reach $140-million.

Assuming the fixes work, Tampa Bay Water says it doesn't plan to run the desal plant at full capacity all the time and isn't required to. Instead, groundwater pumping will increase an average 14-million gallons daily.

Groundwater pumping is cheaper, officials with the utility say. There has been plenty of rain, which seeps into the ground. The pumping will allow them to fill up a new reservoir in eastern Hillsborough.

But excessive groundwater pumping was at the heart of Tampa Bay's water wars of the 1990s, when drying wetlands and lakes caused a huge public outcry. Officials in Hillsborough County are particularly concerned about a perceived backtracking.

"Just to say we've had a rainy year or two allows us to go to harmful groundwater pumping, that's illogical," said Kathy Castor, chairwoman of the county's Environmental Protection Commission.

Hearne contends in his opinion that all of the agreements that led to construction of the desal plant made clear it was expected to run at full capacity all the time to decrease the need for groundwater. He cites the permit that enabled construction of the desal plant and the agreements that spelled out who would pay for it.

Further, he notes that the 1998 agreement that created Tampa Bay Water clearly requires that officials with the utility submit its annual operating plan to Swiftmud, giving it say-so in the matter. Bilenky added that it would seem like a reasonable courtesy.

"You just don't unilaterally do it," he said.

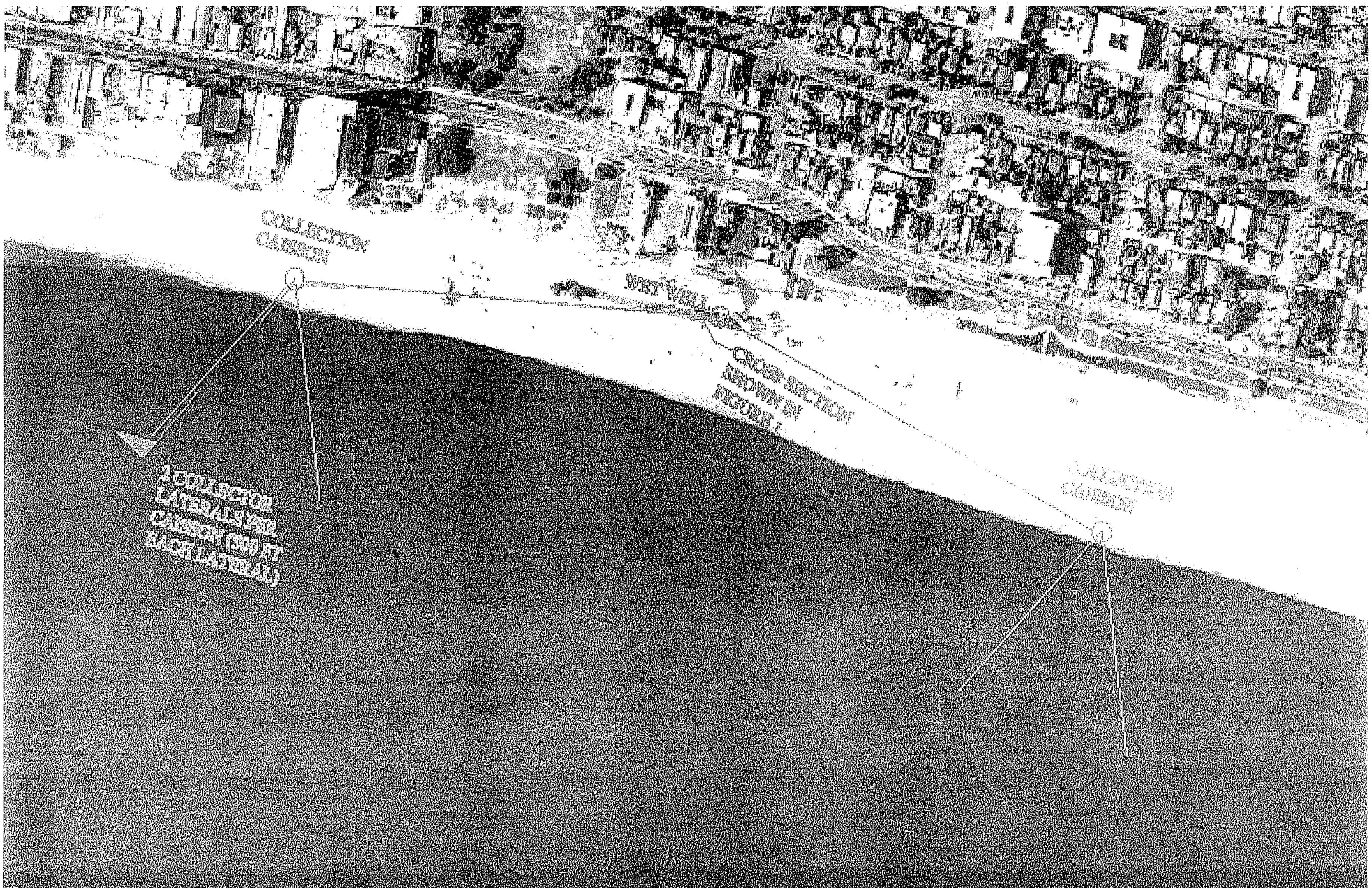
Hearne further contends that his reading of the documents is in keeping with what Tampa Bay Water officials have said themselves - that they intend to use the desal plant as part of their main supply, and use groundwater to meet peak demand.

Maxwell said Monday that that was true until 2002, when Tampa Bay Water took over ownership of the plant from the private companies that built it. Before then, the utility was obligated to buy 25-million gallons daily from the desal plant.

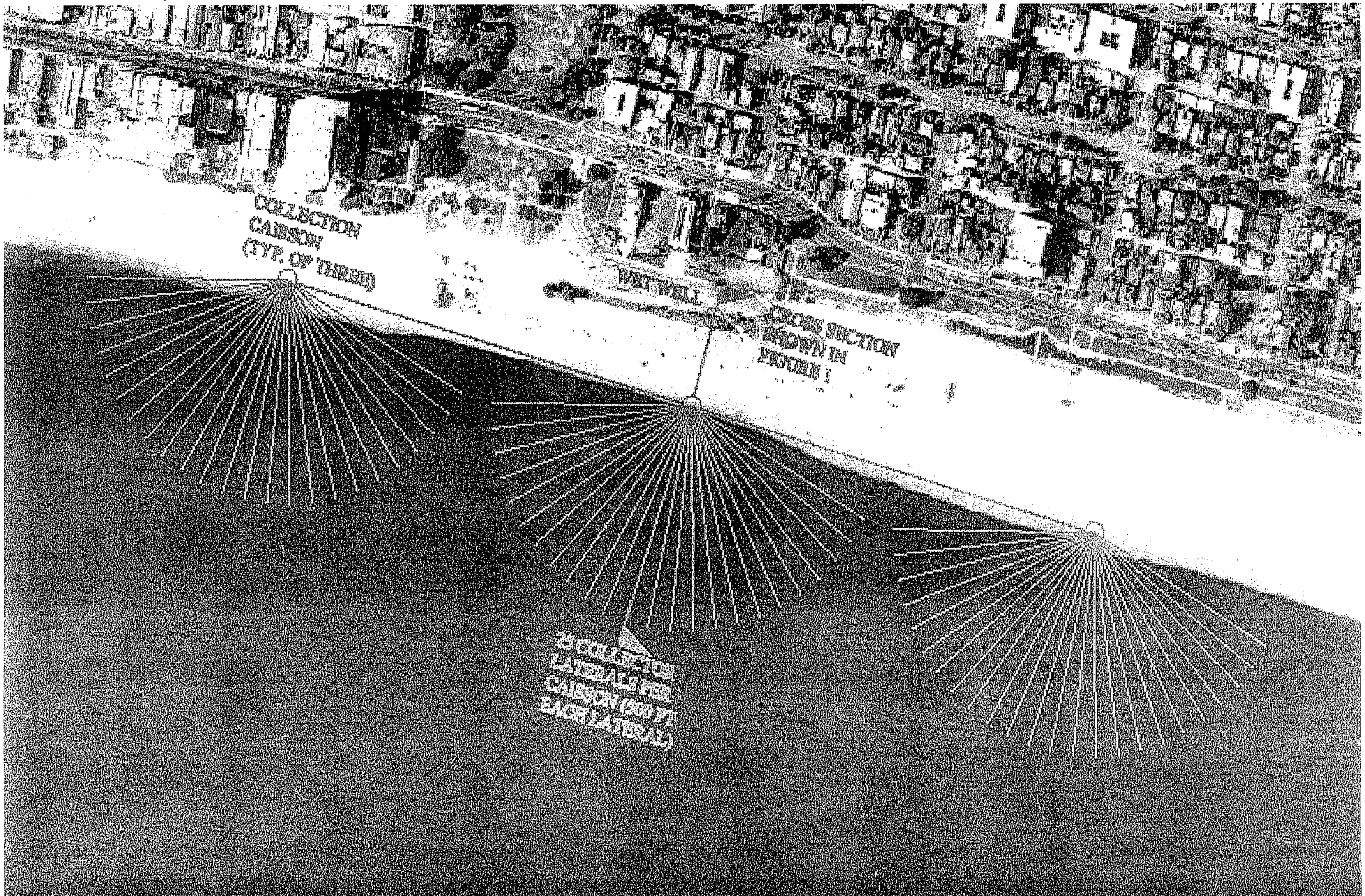
However, a year after the purchase, in April 2003, Maxwell stood before Swiftmud board members and told them the utility still planned to use the desal plant at 25-million gallons daily. It came up as he was describing the sources of water his utility would rely on first before pumping water from underground.

"The fixed supplies," he called them. "Things like the 25 (million gallons daily) from seawater desal."

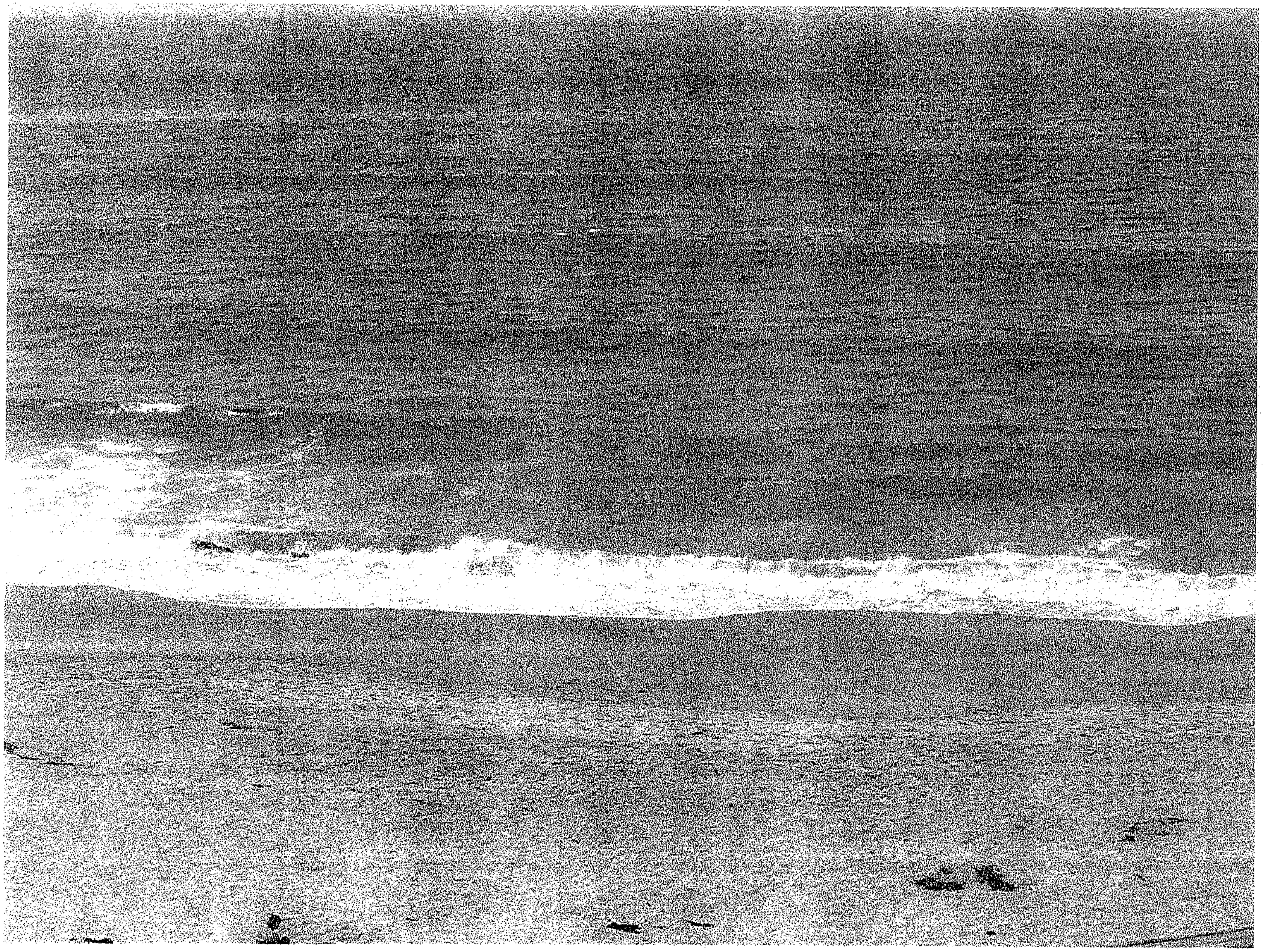
Maxwell said Monday he didn't remember the presentation, that it was one of many given at the time.



Attachment 1: Long beach Water Department Under Ocean Floor Intake/Discharge for demonstration facility



Attachment 2: Long beach Water Department Under Ocean Floor Intake/Discharge for planned full-sized facility 10 mgd (~11,000 acre-feet annually) facility



Attachment 5: Marina State Beach at location of beach well intakes for Marina Coast Water District existing desalination facility

Attachment 6. Marina State Beach available beach area that could accommodate beach well intakes for a desalination facility

C: AB, HS, DF, JO, SP

State Water Resources Control Board

33

Division of Water Rights

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Alan C. Lloyd, Ph.D.
Agency Secretary

Arnold Schwarzenegger
Governor

SEP 13 2005

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to:334:KDM:266.0

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SEP 20 2005
MPWMD

Steven Leonard
California American Water Company
P.O. Box 951
Monterey, CA 93942-0951

Dear Mr. Leonard:

STATE WATER RESOURCES CONTROL BOARD ORDER NO. WR 95-10, 3RD QUARTERLY REPORT FOR WATER YEAR OCTOBER 1, 2004 THROUGH SEPTEMBER 30, 2005, 262.0 (27-01), CARMEL RIVER IN MONTEREY COUNTY

Division of Water Rights (Division) staff has reviewed the report that you submitted for the topic listed above. The submittal complies with the requirements of Order WR 95-10. Thank you for your continued compliance.

The Division has taken note of recent newspaper articles indicating that Sand City is developing its own water desalination facility and intends to de-annex from Cal-Am service. Pursuant to Order WR 95-10, Cal-Am is required to reduce its unlawful diversions from the Carmel River. Cal-Am is requested to inform the Division what it intends to do with the water that will be generated by Sand City's proposed change in water supply. A response is requested within 30 days of the date of this letter.

Katherine Mrowka is the staff person presently assigned to this matter, and she can be contacted at (916) 341-5363.

Sincerely,

ORIGINAL SIGNED BY

Victoria A. Whitney
Division Chief

✓ cc: David A. Berger
General Manager
Monterey Peninsula Water
Management District
P.O. Box 85
Monterey, CA 93942-0085

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September 16, 2005

VIA EMAIL & U.S. MAIL

Mr. David Berger, General Manager
Monterey Peninsula Water Management District
P. O. Box 85
Monterey, CA 93942

Mr. Berger:

I do not believe that we have been introduced, but I have talked with David Laredo on a few occasions since I established a satellite law office at the UC MBEST Center in Marina. My law firm specializes in water, energy, environmental, and public law. This letter is intended to be a constructive critique and an offer of assistance.

1. The Monterey Peninsula is primarily dependent upon a surface water supply from a single river. Consequently, the amount of runoff each water year varies. For the Central Valley, the California Department of Water Resources divides the water years into five types or classifications – Critical (15% of the time), Dry (15%), Below Normal (20%), Above Normal (20%), and Wet (30%). The water year classifications can be refined even further for specific purposes; for example, the lower Tuolumne River has ten water year classifications for setting minimum instream flows from Don Pedro Reservoir for Chinook salmon. For Monterey County, it is probably sufficient at this time to use four water year types – Dry (30%), Below Normal (20%), Above Normal (20%, and Wet (30%).

2. While the District's Comparative Matrix is an excellent way of laying out the key elements of each proposed water project, it appears to have the following flaws:

F-1. The Matrix appears to assume that the 10,730 AF discussed in SWRCB Order WR 95-10 must be replaced in <u>all</u> water years. See Comparative Matrix line 9.

F-2. The Matrix does not analyze by water year type the amount of water available and needed from each water supply source. For example, the amount of water available from the Carmel River in Wet water years may be 10,000 AF but only 4,000 AF in Dry water years. Consequently, water from a desalination plant, whether located at Moss Landing or Sand City, may not be needed by the Monterey Peninsula during Wet water years (30% of the time). See C-4 below.

F-3. Because the Matrix examines each proposed project as though it is independent of the other projects, an integrated water resources plan was not developed. This problem understandably arose because most people are fixated on the two competing Moss Landing desalination projects, which could provide all the needed water but at a very high cost.

3. I attended the morning session of your September 8 workshop in Carmel. During the session, District staff at the request of Director Markey agreed to review and report to the Board on the meaning of the 10,730 AF number in SWRCB Order No. WR 95-10. What the SWRCB said in WR 95-10 was that Cal-Am did not have a legal water right to divert 10,730 AF annually of the water it was then currently diverting from the Carmel River. In Ordering Paragraph 2, Cal-Am was directed (1) to obtain appropriate permits for the water it was unlawfully diverting from the Carmel River, (2) to obtain water from other sources of supply, and/or (3) contract with another agency having existing water rights on the Carmel River. The SWRCB noted that Cal-Am had already filed an application (No. 30215) for 42 cfs from its wells along the Carmel River. The key point is that WR 95-10 did not say that 10,730 AF could not be diverted from the Carmel River in ***all*** water years. Any analysis of the meaning of WR 95-10 would require a review of (1) basic Carmel River hydrology, (2) steelhead and riparian habitat requirements by month, and (3) a water rights analysis of the most senior Carmel River water rights.

4. I prepared the attached tables based upon a very quick, preliminary analysis of available data, Consequently, the numbers you see in the tables are very rough estimates – hopefully they are somewhere in the ballpark to begin a structured analysis of the possibilities. I have some 29 years experience working on surface water and groundwater issues and over 30 years experience working on salmonid issues. I have had to rely on that experience to try to fill in the holes and make educated guesses.

a. Table 1: Water Supply Sources – Availability by Water Year Type.

- For annual Cal-Am water demands by water year type, I used Wet, 17,000 AF, Above Normal, 18,000 AF, Below Normal, 17,000 AF, and Dry, 16,000 AF, for discussion purposes only and without reference to any specific annual water demand numbers. The variation is because water demands normally drop in Wet years and additional conservation is required in Dry years.

- Salinas River Excess Water Project. The point of diversion would be wells located next to the Salinas River and near the MRWPCA facilities. As Curtis Weeks showed in his PowerPoint presentation on September 8, the Salinas River has some 250,000 AF of undeveloped water as opposed to only 60,000 AF for the Carmel River. Water in excess to MCWRA's rubber dam project needs and to steelhead bypass flow needs should be available during January through April in all Wet water years and at times during Above Normal water years.

The USGS monthly streamflow data for the Salinas River near Spreckels for the period October 1929 through September 2004 shows that during the months of January, February, March, and April over that 75-year period, the flow at the Spreckels gage exceeded a monthly mean streamflow of 300 and 500 cubic feet per second as shown below:

Month	# of Times ≥ 300 cfs over 75 years	Percentage of Times over 75 years
January	24	32%
February	40	53.3%
March	39	52%
April	25	33.3%

Month	# of Times ≥ 500 cfs over 75 years	Percentage of Times over 75 years
January	21	28%
February	32	42.7%
March	31	41.3%
April	19	25.3%

The December mean monthly flow exceeded 850 cfs in 10 of the 75 years, or 13.3%.

The Salinas river water could be diverted via wells adjoining the river to minimize treatment costs. A 10 cfs diversion from the Salinas River for 120 days would equal 2,380 AF per year. A 20 cfs diversion for 120 days would equal 4,759 AF per year. The actual rate of diversion would depend upon the amount of water available in excess of (1) the MCWRA rubber dam diversion project, (2) bypass flows needed for steelhead, and (3) any other authorized diversions and depletions between the Spreckels gage and Moss Landing. An application to appropriate the water would need to be filed and approved by the State Water Resources Control Board.

- The Brackish Water Recovery & Treatment Project is not my idea but it is a very creative one. The brackish water would be pumped from the agricultural lands overlying the seawater intrusion zone north of Marina and conveyed to a water treatment facility located at the MRWPCA facilities in Marina. Treating brackish water would use existing proven technology and could be at a significantly lower cost than treating seawater. Excess MRWPCA treated wastewater and excess Salinas River water might need to be injected into the brackish water recovery area as part of a seawater intrusion barrier operation. I have been told that the brackish water pumping would itself act as a partial barrier, but a real technical analysis of this and other related scientific issues is needed.

- The MRWPCA facilities in Marina would be the central location for both the Salinas River Excess Water and the Brackish Water Recovery & Treatment projects. MRWPCA proposed pipeline from its wastewater treatment plant to the ASR would be used and probably a second parallel pipeline to carry treated consideration. I could possibly work initially as a subconsultant under David Laredo's legal service agreement.

Enclosed is a copy of our law firm's brochure and additional information about my firm may be found at our website, www.calwaterlaw.com. I have been special water counsel to the County of Butte since March 1991 and the law firm is attorney to a small county water district in Merced County delivering about 18,000 AF per year for irrigation. The law firm has been outside general counsel to the Turlock Irrigation District since the 1930's. I have been acting in that position since November 1976. TID diverts over 500,000 acre-feet of water per year from the lower Tuolumne River along with groundwater wells to serve approximately 150,000 acres of farmland within Stanislaus and Merced counties. It is the 68.46% owner and project manager of the 2,030,000 acre-foot Don Pedro Reservoir. TID is also a vertically integrated electric utility with a 662 square mile retail electric service area within Stanislaus and Merced counties and within small portions of Tuolumne and Mariposa counties. While restoring riparian habitat and salmon spawning areas on the Tuolumne River, the TID Board of Directors had the foresight to install a 100 cfs capacity infiltration gallery at a cost of some $900,000. It is hoped that in the not-too-distant future the diversion facility will be used to serve M&I water to the cities of Turlock, Ceres, and Modesto (south of the Tuolumne River) from a TID-operated water treatment plant (potential maximum treatment capacity of 35 MGD) and pipelines from the plant to the cities.

To contact me, please call (831) 601-1406, email rmasuda@calwaterlaw.com, or send mail to my Turlock office address.

Very truly yours,

Roger K. Masuda

ROGER K. MASUDA

Encl.

cc: David Laredo, Esq.
Joseph Oliver
Henrietta Stern

Roger Masuda 9-16-05

Table 1
WATER SUPPLY SOURCES – AVAILABILITY BY WATER YEAR TYPE (in Acre-Feet)
[All amounts are very rough estimations]

	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)	Notes
Carmel River – "Firm" (from 95-10)	4,000	4,000	4,000	4,000	
Carmel River – "Variable"	6,000	3,000	2,000	0	Jan thru Apr diversions + other months in Wet and Above Normal water years
Cal-Am Seaside Wells Extractions (from 95-10)	2,500	2,500	2,500	2,500	Extraction amounts are combined in the ASR IN/OUT Table 2.
ASR Extractions	0	2,500	2,500	4,000	
Salinas River Excess Water	2,400	1,000	0	0	SR water diverted via wells located near MRWPCA facilities. SR water is in excess of MCWRA's rubber dam project diversions and of steelhead bypass flows. Additional excess SR water may be needed for injection into Brackish Water Recovery area for seawater intrusion protection.
Brackish Water Recovery & Treatment	2,100	3,000	3,000	0	Pumping saline groundwater underlying agricultural lands located north of Marina. Water to be treated at new treatment facility next to MRWPCA facilities.
Desalination Plant (MPWMD Sand City or Moss Landing plant)	0	2,000	3,000	5,500	MPWMD Sand City plant, Comparative Matrix Table, line 8, 8,409 AFY yield goal.
Totals	17,000	18,000	17,000	16,000	

Roger Masuda 9-16-05

Table 2
MPWMD'S AQUIFER STORAGE AND RECOVERY PROJECT (in Acre-Feet)
Includes Cal-Am's Existing Seaside Wells Extractions
[All amounts are very rough estimations]

	IN (Seaside Basin Recharge + ASR)				OUT (for direct consumption)			
	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)
MRPCWA GR Project (Nov-Feb)	2,800	2,800	2,800	2,800	0	5,000	5,000	6,500
Carmel R. Excess Water (Dec-May)	2,400	1,200	0	0				
Salinas R. Excess Water (Jan-Apr)	2,400	1,000	0	0				
Totals	7,600	5,000	2,800	2,800	0	5,000	5,000	6,500

NOTES:
1. Above 3 sources would allow for injections into ASR during 6 to 7 months during Above Normal and Wet water years.
2. For perspective, MPWMD's ASR 3rd Phase proposes to inject up to 7,300 AF per year and extract up to 6,085 AF per year for use in the Cal-Am water distribution system.
3. MRPCWA GR Project water and Salinas River Excess Water would be conveyed to the ASR via MRPCWA's proposed new pipeline.
4. Could not find projected minimum groundwater storage capacity needed to implement ASR 3rd Phase.

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September 28, 2005

VIA EMAIL & U.S. MAIL

Mr. David Berger, General Manager
Monterey Peninsula Water Management District
P. O. Box 85
Monterey, CA 93942

Re: Determining the Optimum Water Resource Mix – Next Steps

Mr. Berger:

This letter is a follow-up to my letter dated September 16, 2005, to you. Tables 1 and 2 for that letter are enclosed for reference. In the "Update on Comparative Matrix of Water Supply Options" PowerPoint presentation by your staff on September 8, the last slide was on MPWMD Next Steps. The basic two options presented were

- To use updated matrix information to frame policy decision on project(s) to support now.
- Defer policy decisions until RUWS governance agreement is signed and implemented.

The problem with the first option is that an even updated matrix provides only half of the information the Board would need to make sound policy decisions on projects to support. The next steps are to determine the "optimum" water resources mix of existing and proposed new water sources for the Monterey Peninsula. The coordination and integration of regional planning efforts would be very useful. However, as discussed in Step 4 below, the key question is will and can your District become the wholesale water supplier for Cal-Am or will it continue to be just a water planner and water use regulator?

It would be difficult for your Board to make an informed determination on what projects to support now unless the Board understands how all of the existing and proposed new water sources could fit within a total "optimum" water resources mix. The objective is to determine the optimum water resources mix based upon cost and water availability with the understanding that there is never a one "optimum" mix because of continually changing variables, e.g., energy prices.

It is suggested that the District staff perform the following steps:

STEP 1

Step 1-A. Continue to update and assess information on the existing projects in the matrix. For example, all energy cost assumptions need to be reassess, especially Cal-Am and P/SM's energy costs. Line Item 19 of the matrix lists the assumed energy cost in dollars per kilowatt hour. Cal-Am assumed $0.07/kwh, P/SM only $0.05 to $0.06/kwh, while your District used a now more realistic $0.12/kwh. From 70% to 90% of the cost of natural gas fired generation, such as at Duke Energy's Moss Landing generation station, is the cost of the natural gas. For example, $0.08/kwh of a $0.09/kwh electricity cost for natural gas fired generation could be the cost of the natural gas. In Exhibit 4-E-5 to the September 8 staff memorandum, 55.4% of the total annual O&M costs for Cal-Am desalination project are for energy costs. A 50% increase in those energy costs to $0.105/kwh would significantly increase the cost per acre-feet of potable water produced.

Step 1-B. Add the following water sources to the matrix:

(1) Existing Carmel River water supply. This would include an assessment of the availability of Carmel River water under SWRCB Order WR 95-10 as requested by Director Markey.

(2) Excess Salinas River water supply. Much of the information needed for this water supply source has already been compiled by the MCWRA for its Salinas Valley Water Project. As used here, "excess" means Salinas River water in excess of that needed for the Salinas Valley Water Project and for steelhead bypass flows. At the September 8 workshop, Curtis Weeks made an excellent albeit very quick presentation on Monterey County water resources. His presentation pointed out that "Monterey County has ample water supplies – Over 400,000 ac-ft of undeveloped surface water" with 250,000 AF of that consisting of average annual Salinas River outflow.

(3) Brackish Water Recovery water supply. As I indicated, this project wasn't my idea, but I thought that it was a creative one because (a) it potentially could be both a drinking water supply source as well as a means to help check seawater intrusion and (b) it is Steve Leonard's idea. I don't know if he wants it spread around that it is his idea, but Steve told me that when he came to work for Cal-Am, he did a back-of-the-envelop analysis of this type of project. The project would use existing agricultural wells that are now unusable for irrigation. He believed that a series of wells pumping brackish water could act as a barrier to seawater intrusion. The project would use existing tried-and-true treatment technology and should be less expensive to treat because the brackish water would be much less saline than seawater.

Step 1-C. Prepare a separate table for each existing and proposed water source by the amount of water available in acre-feet from that source in each month by water year type. See enclosed Table 3 as an example.

Step 1-D. Prepare a ranking by cost per acre-foot of each existing and proposed water source. See enclosed Table 4 as an example. The ranking would be based upon updated matrix information but with added categories for desalination plant capacity factors (i.e., utilization) at, for example, 60% and 100% of the time. The matrix appears to assume that all desalination plants would be operated at maximum capacity 100% of the time. As you work through Steps 1 and 2, you will see that desalination plants are the most expensive water source on a cost per acre-foot basis because of the high energy costs as mentioned in Step 1-A above. As I stated in my September 16 letter, a desalination plant operating at a 50% plant capacity factor could mean that the plant operates at 100% capacity from mid-May to mid-November and then is shut down for the other 6 months when other less expensive water sources are available.

STEP 2

Step 2-A. Optimum Water Resources Mix for Direct Consumption. Prepare four separate tables for each water year type. Each table would rank the preferred water sources by cost per acre-foot for each month within each water year type. See enclosed Table 5 as an example. There are certainly different or additional criteria to rank the water sources as well as better charting formats to present the data. This table or chart would be the monthly version by Water Year Type of Table 1 but with the water sources ranked in preferred priority of use.

Step 2-B. Optimum Water Resources Mix for Injection into ASR. Prepare four separate tables for each water year type. Each table would rank the preferred water sources by cost per acre-foot for each month within each water year type. See enclosed Table 6 as an example. There are certainly different or additional criteria to rank the water sources as well as better charting formats to present the data. This table or chart would be the monthly version by Water Year Type of Table 2 but with the water sources ranked in preferred priority of injection into the ASR.

Step 2 is a continually iterative process among Tables 3, 4, 5, and 6 as the cost per acre-feet numbers or other ranking criteria and the amount of water availability by month and by water year type are refined for each water source. Those findings could then be summarized in revised Tables 1 and 2. Perfection is not the goal – just a set of sound numbers for your Board.

STEP 3.

Step 3 is further refining the optimum water resources mix by testing the information in Tables 5 and 6 against two and possibly three drought scenarios:

DS-1: The 1976-1977 Drought.
DS-2: The 1987-1992 Drought.
DS-3: Historic drought unique to the Monterey Peninsula (if any) or a possible theoretical drought that is different from DS-1 and DS-2 or is a combination thereof.

STEP 4

Step 4 is for the Board to answer the question of what role should the District play in developing and operating the priority water sources identified through Steps 1 through 3? Should and can the District develop and operate the new water sources and become the wholesale water supplier to Cal-Am, especially if the District determines that a Moss Landing desalination plant does not really need to be built? It is one thing to be a water planner and water use regulator; it is another thing to develop, operate, and integrate major water supply projects.

A regional water resources coordination and integrated planning structure would be highly useful. However, whether to go with MCWRA's draft "Memorandum of Understanding for Integrated Regional Water Management in the Greater Monterey Area" or another type structure should be considered either after or in parallel with considering the wholesale water supplier question.

* * * * *

Determining the optimal water resource mix by water year type for the Monterey Peninsula because of the multiple potential water sources is more akin to integrated energy resource planning for a hydroelectric based electric utility than to normal drinking water resource planning. All of the existing and proposed water sources use varying amounts of energy depending upon the amount of pumping (for diversion, conveyance, injection, and extraction) and treatment needed. Now that Duke Energy has announced that its Moss Landing power generation station is up for sale, a big picture question could be should the District and/or the County consider acquiring a small partial interest in the station, e.g., 5% or less, should a buyer or a consortium of buyers come forward? Owning a portion of the station would entitle the buyer to electrical output and possibly the use of the station's other facilities (e.g., seawater intake and discharge facilities for use by a desalination plant if determined necessary). Probably too expensive but it is an existing opportunity.

Your staff already has much of the information needed to perform Steps 1 through 3. I am available to answer questions and to provide assistance.

Very truly yours,

Roger K. Masuda

ROGER K. MASUDA

Encl.

Roger Masuda 9-16-05

PRELIMINARY - FOR ILLUSTRATIVE PURPOSES ONLY

Table 1

WATER SUPPLY SOURCES – AVAILABILITY BY WATER YEAR TYPE (in Acre-Feet)

[All amounts are very rough estimations]

	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)	Notes
Carmel River – "Firm" (from 95-10)	4,000	4,000	4,000	4,000	
Carmel River – "Variable"	6,000	3,000	2,000	0	Jan thru Apr diversions + other months in Wet and Above Normal water years
Cal-Am Seaside Wells Extractions (from 95-10)	2,500	2,500	2,500	2,500	Extraction amounts are combined in the ASR IN/OUT Table 2.
ASR Extractions	0	2,500	2,500	4,000	
Salinas River Excess Water	2,400	1,000	0	0	SR water diverted via wells located near MRWPCA facilities. SR water is in excess of MCWRA's rubber dam project diversions and of steelhead bypass flows. Additional excess SR water may be needed for injection into Brackish Water Recovery area for seawater intrusion protection.
Brackish Water Recovery & Treatment	2,100	3,000	3,000	0	Pumping saline groundwater underlying agricultural lands located north of Marina. Water to be treated at new treatment facility next to MRWPCA facilities.
Desalination Plant (MPWMD Sand City or Moss Landing plant)	0	2,000	3,000	5,500	MPWMD Sand City plant, Comparative Matrix Table, line 8, 8,409 AFY yield goal.
Totals	17,000	18,000	17,000	16,000	

PRELIMINARY - FOR ILLUSTRATIVE PURPOSES ONLY

Table 2

MPWMD'S AQUIFER STORAGE AND RECOVERY PROJECT (in Acre-Feet)

Includes Cal-Am's Existing Seaside Wells Extractions

[All amounts are very rough estimations]

	IN (Seaside Basin Recharge + ASR)				OUT (for direct consumption)			
	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)	Wet (30%)	Above Normal (20%)	Below Normal (20%)	Dry (30%)
MRWPCA GR Project (Nov-Feb)	2,800	2,800	2,800	2,800	0	5,000	5,000	6,500
Carmel R. Excess Water (Dec-May)	2,400	1,200	0	0				
Salinas R. Excess Water (Jan-Apr)	2,400	1,000	0	0				
Totals	7,600	5,000	2,800	2,800	0	5,000	5,000	6,500

NOTES:
1. Above 3 sources would allow for injections into ASR during 6 to 7 months during Above Normal and Wet water years, except that the MRWPCA would provide water to be injected in all water years.
2. For perspective, MPWMD's ASR 3rd Phase proposes to inject up to 7,300 AF per year and extract up to 6,085 AF per year for use in the Cal-Am water distribution system.
3. MRWPCA GR Project water and Salinas River Excess Water would be conveyed to the ASR via MRWPCA's proposed new pipeline.
4. Could not find projected minimum groundwater storage capacity needed to implement ASR 3rd Phase.

Table 3

Name of Water Source: Excess Salinas River Water
Water Availability by Month (in Acre-Feet)

	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
Wet												
Above Normal												
Below Normal												
Dry												

PRELIMINARY - FOR ILLUSTRATIVE PURPOSES ONLY

Table 4

Ranking of Water Sources from Highest Cost to Lowest Cost by Cost per Acre-Foot

MPWMD Sand City Desalination Project at 60% plant capacity factor for direct consumption
Moss Landing Desalination Project at 60% plant capacity factor for direct consumption
MPWMD Sand City Desalination Project at 100% plant capacity factor for direct consumption*
Brackish Water Recovery Project for injection and recovery from ASR
Brackish Water Recovery Project for direct consumption
Moss Landing Desalination Project at 100% plant capacity factor for direct consumption *
MRWPCA Groundwater Replenishment Project for injection and recovery from ASR
Excess Salinas River water for injection and recovery from ASR
Excess Salinas River water for direct consumption
Excess Carmel River water for injection and recovery from ASR
Carmel River water for direct consumption

*Rank could change if 60% of plant output is for direct consumption and the other 40% is for injection into the ASR with the added recovery costs.

NOTES:
1. Table assumes that all water pumped from the Seaside Aquifer/ASR has been injected from one of the above sources.
2. Table assumes that all water will be treated to the required water quality standard either for injection or for direct consumptive use.

Roger Masuda 9-28-05

Table 5

Optimum Water Resource Mix for Direct Consumption for Wet Water Years

Water Availability by Month (in Acre-Feet) Ranked by Cost per AF

	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
Desal Plant water	#5 EAA AF	#5 EAB AF	Not Needed									
Brackish water	#4 DAA AF	#4 DAB AF	#4 DAC AF									
Excess Salinas R. water	Not Available	Not Available	#3 CAA AF									
ASR water	#2 BAA AF	#2 BAB AF	#2 BAC AF									
Carmel R. water	#1 AAA AF	#1 AAB AF	#1 AAC AF									

NOTE;
1. This is the monthly version of Table 1 but with water sources ranked by cost per AF.
2. There would be a separate table for each of the four water year types.

Table 6

Optimum Water Resource Mix for Injection into ASR
for
Wet Water Years

Water Availability by Month (in Acre-Feet) Ranked by Cost per AF

	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sep**
Carmel R. water	#1 XXX AF											

NOTE:
1. This is the monthly version of Table 2 but with water sources ranked by cost per AF.
2. There would be a separate table for each of the four water year types.