



EXHIBIT 1-A

Bookman-
Edmonston



A Division of GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Seawater Desalination Projects Evaluation

Submitted to:
Monterey Peninsula Water Management District

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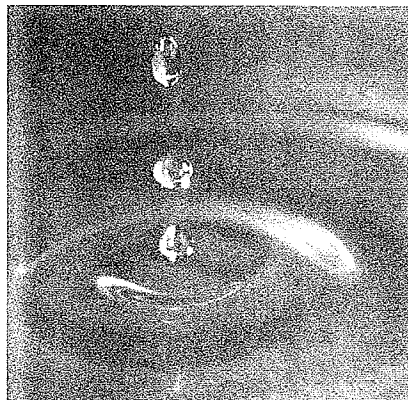


Table of Contents

Seawater Desalination Projects Evaluation i

	Executive Summary	ES-1
	Project Summaries	ES-1
	Project Function	ES-2
	Projected Performance	ES-3
	Economics	ES-4
	Regional Water Supply Considerations	ES-6
	Implementability	ES-7
1	Introduction	1-1
2	Project Summaries	2-1
	2.1 Coastal Water Project	2-1
	2.2 Monterey Bay Regional Seawater Desalination Project (P/SM)	2-4
	2.3 Sand City Desalination Project (MPWMD)	2-6
3	Project Function	3-1
	3.1 Coastal Water Project	3-3
	Project Purpose	3-3
	Customers Identified	3-3
	Technology Appropriate/Demonstrated on this or Similar Supply	3-3
	Pretreatment System	3-3
	Reverse Osmosis	3-4
	Conclusion	3-4
	Waste Stream Fate Identified	3-5
	Availability of Historic Feedwater Quality Data and Sanitary Survey	3-5
	Quality of Supporting Documentation	3-5
	Supports Regional and MPWMD Objectives	3-7
	Omissions or Fatal Flaws	3-7
	3.2 Monterey Bay Regional Seawater Desalination Project	3-7
	Project Purpose	3-7
	Customers Identified	3-7
	Technology Appropriate/Demonstrated on this or Similar Supply	3-8
	Pretreatment	3-8
	Reverse Osmosis	3-8
	Conclusion	3-8
	Waste Stream Fate Identified	3-9

	Availability of Historic Feedwater Quality Data and Sanitary Survey	3-10
	Quality of Supporting Documentation	3-11
	Supports Regional and MPWMD Objectives	3-11
	Omissions or Fatal Flaws	3-11
3.3	Sand City Desalination Project	3-11
	Project Purpose	3-11
	Customers Identified	3-12
	Technology Appropriate/Demonstrated on this or Similar Supply	3-12
	Pretreatment	3-12
	Reverse Osmosis	3-12
	Conclusion	3-13
	Waste Stream Fate Identified	3-13
	Availability of Historic Feedwater Quality Data and Sanitary Survey	3-13
	Quality of Supporting Documentation	3-13
	Supports Regional and MPWMD Objectives	3-14
	Omissions or Fatal Flaws	3-14
4	Projected Performance	4-1
4.1	Coastal Water Project	4-1
4.2	Monterey Bay Regional Seawater Desalination Project	4-3
4.3	Sand City Desalination Project	4-4
5	Economics	5-1
5.1	Coastal Water Project	5-3
	Capital Cost	5-3
	Operation and Maintenance Cost	5-5
	Financing - Identification & Adequacy	5-5
	Quality of Cost Estimate	5-7
5.2	Monterey Bay Regional Seawater Desalination Project	5-7
	Capital Cost	5-7
	Operation and Maintenance Costs	5-10
	Financing - Identification & Adequacy	5-11
	Quality of Cost Estimate	5-12
5.3	Sand City Desalination Project	5-12
	Capital Cost	5-12
	Operation and Maintenance Costs	5-14
	Financing - Identification & Adequacy	5-14
	Quality of Cost Estimate	5-15
6	Regional Water Supply Considerations	6-1
6.1	Coastal Water Project	6-1
6.2	Monterey Bay Regional Seawater Desalination Project	6-2

6.3	Sand City Desalination Project	6-2
7	<u>Implementability</u>	7-1
	Permits Identified, Secured, and/or Degree of Difficulty	7-1
	U.S. Environmental Agency Power Plant Regulation (Phase II Section 316(b))	7-5
	Resolution of the California State Lands Commission	7-6
	Environmental Impacts or Environmental Documentation	7-7
	Monterey Bay Aquatic Environment	7-8
	Easements and Agreements Identified and Secured	7-8
7.1	Coastal Water Project	7-8
	Schedule Identified	7-8
	Environmental Impacts or Environmental Documentation	7-9
	Conclusion	7-10
7.2	Monterey Bay Regional Seawater Desalination Project	7-11
	Schedule	7-11
	Environmental Impacts or Environmental Documentation	7-11
	Conclusion	7-13
7.3	Sand City Desalination Project	7-13
	Schedule	7-13
	Environmental Impacts or Environmental Documentation	7-13
	Conclusion	7-14
8	<u>References</u>	8-1

Tables

Table ES-1 - Summary of Desalination Project Capacities and Estimated Costs	ES-6
Table 1 - Intake and Waste Stream Comparison	3-2
Table 2 - Summary of Desalination Project Capacities and Estimated Costs	5-2
Table 3 - CWP 2005 Capital Cost	5-3
Table 4 -CWP 2005 Operations, Repairs, and Replacement Annual Costs Summary	5-5
Table 5 -MBRSDP 2006 Capital Cost	5-7
Table 6 - MBRSDP 2004 Preliminary Capital Cost	5-8
Table 7 - SCDP 2004 Capital and O&M Costs	5-13
Table 8 - Summary of Project Size and Areas Served	6-1
Table 9 - Regulatory Requirements	7-2
Table 10 - MBRSDP Schedule	7-11

Figures

Figure 1 - Coastal Water Project Location Map	2-3
Figure 2 - Monterey Bay Regional Seawater Desalination Project Location Map	2-5
Figure 3 - Sand City Desalination Project Location Map	2-7
Figure 4 - Joint Separation on National Refractories Outfall	3-9
Figure 5 - Clogged Diffusers on National Refractories Outfall	3-10
Figure 6 - Coastal Water Project Schedule	7-9

Executive Summary

Bookman-Edmonston (B-E), a Division of GEI Consultants, Inc., along with sub-consultants Malcolm Pirnie, Inc. and Separation Processes, Inc., is providing engineering support to the Monterey Peninsula Water Management District (MPWMD) to review and evaluate three seawater desalination projects that have been proposed for the Monterey Peninsula. The three projects and their respective sponsors are:

1. California American Water (Cal-Am) – Coastal Water Project (CWP). This project includes an aquifer storage and recovery (ASR) component in the Seaside Groundwater Basin.
2. Pajaro/Sunny Mesa Community Services District (P/SM) in cooperation with Poseidon Resources Corporation (Poseidon) – Monterey Bay Regional Seawater Desalination Project (MBRSDP)
3. MPWMD – 7.5 million-gallon-per day (MGD) Sand City Desalination Project (SCDP)

Project Summaries

The three projects are in the conceptual or preliminary stage and all three have as their objective to assist the affected Monterey Peninsula communities to comply with the State Water Resources Control Board (SWRCB) Order No. 95-10. Brief summaries of the projects are:

Project name:	Coastal Water Project (CWP)
Proponent(s):	California American Water (Cal-Am)
Location:	Moss Landing Power Plant, Moss Landing
Purpose:	<p>Primarily (Basic Coastal Water Project), to comply with State of California Water Resources Control Board Order No. 95-10 by replacing the Carmel River shortfall and to offset a portion of the Seaside Basin overdraft.</p> <p>Secondarily (Regional Coastal Water Project), as a regional water supply project to meet the Monterey Peninsula build-out water demands, the water needs of the Marina Coast Water District and the water needs of Moss Landing, Castroville and North Monterey County.</p> <p>The project is currently progressing as the Basic Coastal Water Project</p>
Production volume:	<p>Basic Coastal Water Project: 11,730 Ac-Ft per year (includes 1,300 Ac-Ft per year from Seaside Basin ASR)</p> <p>Regional Coastal Water Project: 20,272 Ac-Ft per year (includes 1,300 Ac-Ft per year from Seaside Basin ASR)</p>

Project name:	<u>Monterey Bay Regional Seawater Desalination Project (MBRSDP)</u>
Proponent(s):	Pajaro/Sunny Mesa Community Services District in cooperation with Poseidon Resources Corporation
Location:	The former National Refractories and Minerals Corporation plant site, Moss Landing
Purpose:	To replace existing water supplies serving the greater Monterey Bay region including supplies to the cities of the Monterey Peninsula, the unincorporated area of northern Monterey County, the service area of the Pajaro/Sunny Mesa Community Service District and portions of the Pajaro Valley Water Management Agency.
Production volume:	20 MGD (22,400 Ac-Ft per year)

Project name:	<u>Sand City Desalination Project (SCDP)</u>
Proponent(s):	Monterey Peninsula Water Management District
Location:	The desalination plant would be constructed at one of three potential sites within the City of Sand City. Seawater collection wells would be in the City of Sand City and on the property of the former Fort Ord. Brine disposal would be through the Monterey Regional Water Pollution Control Agency outfall north of Marina
Purpose:	To assist Cal-Am to develop a legal water supply to meet the provisions of the State Water Resources Control Board Order No. 95-10.
Production volume:	7.5 MGD (8,400 Ac-Ft per year)

Project Function

The primary purpose of the Basic CWP and the SCDP is to resolve the issues associated with SWRCB Order No. 95-10 and the overdraft of the Seaside Groundwater Basin. In addition to resolving these two issues the Regional CWP and the MBRSDP would provide solutions to regional water supply issues.

Each of the projects has primarily identified customers within Cal-Am's service area due to the implications of SWRCB Order No. 95-10. In addition, the Regional CWP and the MBRSDP have identified potential customers to the north. The only commitment by these northern customers would be for the MBRSDP in the PSMCSD service area.

The proposed technology for the seawater intake and brine discharge for the three projects varies. The primary difference is the proposal to use wells for feed water at the SCDP compared to ocean intakes for the CWP and the MBRSDP. Wells may avoid significant pretreatment and its associated cost. A great deal of information on the appropriate seawater desalination technology will be obtained during the pilot plant testing scheduled for the CWP and the MBRSDP.

Brine discharge for the CWP would be via the MLPP outfall. For the MBRSDP, the primary option for brine discharge is the NRMC outfall, with the MLPP outfall as an alternative. Technically, either of these discharge options may be possible, however additional studies are needed to determine the NRMC outfall's structure integrity and the fate of the brine if discharged at this location. Brine discharge for the SCDP would be via horizontal directionally drilled wells along the coastline north of Sand City in former Fort Ord, or via the Monterey Regional Water Pollution Control Agency outfall as an alternative. Additional studies will be needed to determine if brine discharge to HDD wells is feasible and if seasonal storage is needed if the outfall is utilized.

The biggest issues with the waste stream fate are institutional constraints. There are long-term issues associated with one-pass power plants discharges to the ocean and the impact of concentrated seawater brine discharge to the ocean. These issues will need to be resolved for any project that moves forward.

CWP proponents have produced the most comprehensive supporting documentation of the three projects. The CWP is the only project that has produced an environmental documents beyond the draft level. The CWP has a number of site specific studies that appear to have been useful in the preparation of their supporting construction cost information and provides a solid foundation for any future design work.

The MSRSDP has the most comprehensive information for its pilot plant work. The project is in the process of obtaining the necessary permits to construct and operate the pilot plant. The MSRSDP is also the only one of the three projects that has an agreement or has secured rights to the land for their proposed treatment plant project.

The SCDP has been developed conceptually but has not yet concluded on the location of the desalination facility or determined a treated water pipeline alignment. Additional technical work on the use of the MRWPCA outfall is also needed to determine what seasonal storage requirements would be needed.

Projected Performance

Several potential issues were identified for the CWP from its Conceptual Design Report (CDR). One issue is the formation of significant chlorinated disinfection by-products (DBPs). DBPs could result from the reaction of total organic carbon (TOC) in the MLPP Units 6 & 7 intake, with the proposed amount of free chlorine and a combined 21 minutes of contact time in the coagulation and flocculation processes.

Other concerns are the allocation of the physical pathogen removal credits, identification of a target for total dissolved solids (TDS), and the possible presence of synthetic organic chemicals (SOCs) in Moss Landing Harbor. The CWP Concept Design Report (CDR) does not specify how the physical pathogen removal credits for *Giardia*, *Cryptosporidium*, and viruses will be allocated throughout the treatment process by the State of California

Department of Health Services (CDHS) nor does it identify a target for TDS. All these issues warrant more detailed planning as the CWP enters the pilot stage.

Areas of concern for the MBRSDP are the information gaps provided by the MBRSDP CDR regarding the allocation of physical pathogen removal credits, pesticides and agricultural runoff, and the use of chloramines to comply with CDHS disinfection requirements. However, the CDR does note that formation of DBPs would not be a concern due to the low TOC levels compared with CWP TOC levels.

In addition to the information gaps, the most significant water quality concerns associated with the MBRSDP involve the diverse systems owned by the Pajaro/Sunny Mesa Community Services District (PSMCS). The MBRSDP CDR indicates that the water produced by the plant is compatible with the water in the PSMCS's distribution system. However, with customers not yet identified and a variety of disparate water qualities among the systems owned by the PSMCS, this claim cannot be substantiated. If the water quality is moderately different, it may be infeasible to treat the desalinated water to match that of the receiving water of each system. Moreover, additional pipe loop and/or coupon testing may need to be conducted for the piping in each receiving system.

A major area of concern for the SCDP is the occasional non-point source pollution, which could potentially cause the beach wells to become infiltrated with enteric viruses, SOCs, pharmaceutical residuals, and/or endocrine disruptors. Because there are no test wells constructed at this stage of project development, the potential for such contamination cannot be accurately assessed. However, the acknowledgement and awareness of this possible contamination is important at this early stage of project development.

Economics

The three projects are in various stages of development. The CWP and the SCDP are at a conceptual or preliminary level, but the CWP is more developed. More work on resolving site specific technical issues for the CWP has been performed; therefore a more complete assessment of the associated construction costs has been made. Construction costs for the SCDP were estimated based on potential alignments due to the fact that the SCDP does not have a preferred treatment plant site or preferred pipeline alignment. The MPRSDP is the least developed and is at a screening level of development. Construction cost estimates are apparently developed from projects of similar nature. The breakdowns of costs for the three projects are provided in Section 5.

The estimated capital cost for the CWP is \$151M (2005 dollars) (excludes ASR costs) and the total O&M cost with membrane replacement is \$8.12 M/year (excludes ASR costs). Long-term financing for the capital investment required to implement the CWP has not been secured by Cal-Am, but it is clear that the company has an avenue to secure such financing when required.

Table ES-1 - Summary of Desalination Project Capacities and Estimated Costs

Project	Plant Capacity	Annual Production	Estimated Total Capital Cost (Year)	Estimated Total O&M Costs (Year)	Cost per Acre-Ft
Coastal Water Project (desal portion only ¹)					
Proposed project (meets SWRCB Order No. 95-10)	10 MGD ²	10,430 Ac-Ft/ year ³	\$151,103,920 ⁴ (2005)	\$8,117,000 ⁶ (2005)	\$1944 ^{8 11}
Regional project	18 MGD	18,972 Ac-Ft/ year	\$237,803,000 ⁷ (2005)	\$10,484,000 ⁹ (2005)	\$1562 ^{8 12}
Monterey Bay Regional Seawater Desalination Project	20 MGD	22,400 Ac-Ft/ year	\$169,026,926 ^{5,9} (2006)	\$16,900,000 ^{5,9} (2006)	\$1352 ^{8 13}
Sand City Desalination Project	7.5 MGD	8,400 Ac-Ft/ year	\$176,200,000 - \$193,000,000 (ENR CCI ¹⁰ = 7,644 [San Francisco, Dec. 2002])	\$8,740,000 - \$9,090,000 (ENR CCI ¹⁰ = 7,644 [San Francisco, Dec. 2002])	\$2729-\$2931 ^{8 14}

- ¹ Costs for the aquifer storage and recovery component of the Coastal Water Project have been subtracted from the total project costs provided by Cal-Am.
- ² million gallons per day
- ³ acre-feet per year
- ⁴ \$110,780,000 capital costs, 24% implementation and 10% contingency. Excludes ASR costs. Excludes pilot plant estimated costs of \$2,585,000 and ROW/easement costs of \$2,000,000.
- ⁵ Desalination Facility Capital and implementation costs and contingency are co-mingled without identification. No Row/Easement Costs are identified. Transmission pipeline costs include 23.5% implementation costs and a 25% contingency.
- ⁶ From CWP data excluding Terminal Reservoir/ASR Pump Station operating and Segunda/ASR System costs. Includes all CWP supplied repairs and replacement costs.
- ⁷ \$174,342,377 capital costs, 24% implementation and 10% contingency. Excludes ASR costs. Excludes Pilot Plant estimated costs of \$2,585,000 and Row/Easement Costs.
- ⁸ Capital cost amortized over 30 years at 7%
- ⁹ Estimated costs for the two regional projects do not include distribution system facilities that would be required for serving areas other than the Monterey Peninsula.
- ¹⁰ Engineering News Record, Construction Cost Index
- ¹¹ \$2,104 per acre-ft if capital cost contingency is adjusted 15% as recommended
- ¹² \$1,699 per acre-ft if capital cost contingency is adjusted 15% as recommended.
- ¹³ \$1,434 per acre-ft if capital cost contingency is adjusted 15% as recommended.
- ¹⁴ \$2,491 - \$2,693 if power consumption is reduced by recommended 33%.

Regional Water Supply Considerations

The CWP will serve the Cal-Am territories on the Monterey Peninsula and adjacent areas. It will provide enough desalinated water to comply with SWRCB Order No. 95-10. An option is under consideration to upsize to the Regional CWP to allow for future increased deliveries to the Monterey Peninsula.

The MBRSDP will serve the Monterey Peninsula, north Monterey County, PSMCSD service areas and portions of the Pajaro Valley Water Management Agency. Contemplated major distribution system serving areas north, east, and west of the National Refractories treatment plant site could be added incrementally in the future.

The SCDP is intended to serve only the Cal-Am territories and will only partially offset Order 95-10 reductions. The project should be capable of expansion, provided additional planning is performed. However, the implementation of this project would degrade the economics of the CWP and MBRSDP to the point where they may not be viable.

Implementability

Mitigating impingement and entrainment impacts from seawater intake is a major issue for any of three projects. The proposed CWP desalination plant would not have a separate direct ocean water intake. It would instead receive raw seawater from the MLPP cooling water return system. Water withdrawn from MLPP would not alter the operations of the MLPP nor would it change the volume and velocity of water entering the MLPP intakes. Also the implementation of the desalination facility would not alter the potential impacts associated with operation of the MLPP. Therefore, as long as the MLPP is permitted to operate, the CWP would not have any adverse impacts on the aquatic resources of the associated marine environment.

The proposed water intake for the MBRSDP would be from one of two sources 1) direct pumping from the Monterey Bay via the existing National Refractories intake and/or 2) the cooling water from Units 6 & 7 at the MLPP. For the full-scale MBRSDP facility the heated water from the MLPP represents the preferred source. No evidence was found to indicate that the cooling water system operations would result in an adverse impact on the populations of fish and invertebrates inhabiting Moss Landing Harbor, Elkhorn Slough and Monterey Bay. Assessment of potential impacts of operating the National Refractories outfall could not be conducted due to earthquake damage to the outfall.

The SCDP would include either an array of horizontal directionally-drilled or radial collector wells for seawater collection located along the coastal beachfront of Sand City. Because the intake for the seawater is below the sea floor, it is assumed no potential impacts from impingement or entrainment would result from seawater withdrawal. However, additional studies are needed to determine the efficiency of such a system.

Schedules for the CWP and the MBRSDP are similar, with the target of delivering water by 2010. The SCDP currently does not have an updated schedule.

All three projects would have similar permitting requirements. Little activity has been done in this area. Primarily, permitting activities for the CWP and MBRSDP have focused on the pilot plant. MBRSDP has obtained a permit for their pilot plant from Monterey County but still have to obtain a permit from the Coastal Commission. CWP has yet to secure either permit.