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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

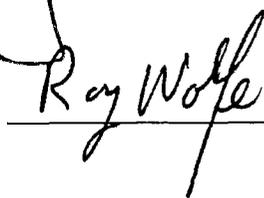
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June 17, 1997

To: Board of Directors (Special Committee on Water Quality, Desalination, and Environmental Compliance--Action)
(Engineering and Operations Committee--Action)
(Budget and Finance Committee--Action)

From: General Manager





Submitted by: Mark D. Beuhler
Director of Water Quality

Subject: Appropriation No. 15301 for \$246,200 to Finance All Estimated Costs for the First Year of the Colorado River Water Salinity Reduction Partnership

RECOMMENDATION

That the Board authorize Appropriation No. 15301, in the amount of \$246,200 from the Pay-As-You-Go Fund, to finance the first year of a proposed five-year program to evaluate new and innovative technologies for desalting Colorado River Water (CRW).

CAPITAL FUNDING REQUEST

Project Name:	Colorado River Water Salinity Reduction Partnership		
Appropriation No.:	15301	Funding Request No.:	New
		Amount:	\$246,200
Source of Funds:	Pay-As-You-Go-Fund		
FY 97-98 Budget:	No <input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	@ \$246,200
		Capital Program:	97819-W
		Page No. Reference:	E-73
Project Justification and Type: (check all applicable)			
<input type="checkbox"/> Meet Water Demands	<input checked="" type="checkbox"/> New Facility	<input type="checkbox"/> Replacement	
<input type="checkbox"/> Mandated By Law	<input checked="" type="checkbox"/> Improvement	<input type="checkbox"/> Expansion	
<input type="checkbox"/> Asset Protection/Risk Mgt.			
<input checked="" type="checkbox"/> Cost Avoidance			
<input checked="" type="checkbox"/> Other <u>Customer Satisfaction</u>			

PROJECT DESCRIPTION

Salinity levels in Southern California surface water and groundwater supplies have been slowly increasing. One reason for this increase is the high salinity of imported CRW (with a total dissolved solids [TDS] concentration of 600 to 800 mg/L). High TDS concentrations cause problems for agriculture, industrial processes, and homeowners through corrosion and scaling of plumbing fixtures and appliances. They also limit wastewater recycling and groundwater recharge in some cases.

Salinity removal technologies are expensive. It is estimated that it would cost at least \$250 per acre-ft to reduce the salinity in CRW from 750 mg/L to about 500 mg/L using conventional membrane and distillation technologies. This cost includes both capital and operations and maintenance. A significant cost component for membrane treatment is electrical power for pumping to obtain the necessary membrane pressure differential. At present, this cost is too high to make widespread salinity reduction feasible. However, if the cost could be reduced through new and innovative technologies, large-scale desalination may be possible.

Salinity removal costs could be reduced through a breakthrough in removal technology such as capacitive deionization with carbon aerogel electrodes or new membranes, use of low (or no) cost pretreatment, technological innovations that take advantage of economies

of scale (few reverse osmosis plants are larger than 5 to 10 MGD), and innovations in brine and/or solid residual reduction and disposal. Alone or in combination, advancements in these areas could substantially reduce treatment costs. If successful, these new technologies could fundamentally change the salinity issue for CRW and also be applicable to other sources of supply, such as reclaimed water, agricultural drainage water, and local groundwater.

The key to testing these technologies is the development of prototypes to prove their practical application. Bench-, pilot-, and demonstration-scale studies are proposed to be conducted initially to determine the necessary design criteria for the prototypes. Three to five prototypes would then be designed, constructed, and installed at Metropolitan's facilities (most likely along-side the oxidation demonstration plant). The aforementioned technologies would be evaluated for their potential to cost-effectively treat CRW and other water supplies.

A five-year applied research partnership is envisioned to evaluate new and innovative desalination technologies involving Metropolitan, member agencies and subagencies (e.g., Orange County Water District), Lawrence Livermore National Laboratory (developer of the carbon aerogel process), governmental agencies, and outside experts. Funds from other partners, stakeholders (e.g., Southern California Edison [SCE] and the Electric Power Research Institute), research grants, and legislative sources (e.g., the State Electrical Restructuring Bill [AB 1890] and various federal sources) would be used to offset some of the research and development costs incurred by Metropolitan and others conducting the work. For example, we will be receiving about \$100,000 from SCE, and a proposal has been submitted to the American Water Works Association Research Foundation (AWWARF) requesting another \$100,000 to help support the desalting work. Metropolitan and its partners may also be in a position to gain financially from the development and implementation of new and innovative desalting technologies.

The scope of work for the first year of the project is modest but critical. Preliminary bench- and pilot-scale studies will be conducted to evaluate the different treatment technologies. If the results from the first year of work merit further investigation, staff will approach the Board in July of 1998 to request additional funding for the project. Several milestone decision points will be incorporated into the program to review progress and determine future direction. Continued efforts on this program will be based on promising test results, the amount of outside funding received, and input from your Board and member agencies.

Class: -- 3

BENEFIT

The salinity level in CRW is significantly higher than the United States Environmental Protection Agency (EPA) secondary standard of 500 mg/L. This standard is based on aesthetics and customer satisfaction rather than health effects. High TDS levels cause problems for agriculture, industrial processes, and homeowners through scaling of plumbing fixtures and appliances. Elevated TDS levels also limit the use of reclaimed water for irrigation

and groundwater recharge. For these reasons, Metropolitan has adopted a policy of blending CRW with State Project water (SPW) for management of salinity concentrations.

CRW users in California, Arizona, and Nevada have suffered significant economic impacts due to long-term continued use of water with elevated salinity levels. At the current level of 700 mg/L, the United States Bureau of Reclamation (Bureau) estimated impacts of about \$750 million per year for the Lower Basin. Of this \$750 million per year in damage, 51 percent is from residential damage, 24 percent from utility infrastructure damage, 20 percent from agriculture damage, and 5 percent from industrial damage. Metropolitan is currently working with the Bureau to update the impacts to its service area.

The goal of this project is to evaluate new and innovative desalination technologies with the intent of reducing treatment costs. If the cost of salinity removal could be substantially reduced, it would become a viable tool to solve the long-term salinity problem in Southern California. This would also be valuable to other western water utilities that use significant amounts of CRW such as Las Vegas, Phoenix, and Tucson, and may also have applicability nationally and internationally in arid or semi-arid regions.

COMPREHENSIVE APPROACH

Metropolitan is currently conducting the Salinity Management Study in association with the Bureau. This study is identifying salinity problems and evaluating a broad array of options to support a level of salinity management commensurate with good resource management and customer needs for Southern California over the next twenty years. Measures to be taken by Metropolitan, as well as by other agencies with the ability to influence salinity affecting the region, are being investigated collaboratively with member and other concerned agencies.

Opportunities to manage salinity in the service area include expanded blending and operational practices regarding SPW; expanded control of salinity sources in CRW, SPW and local waters and wastewater; the CALFED Delta solution; operational changes in the State Water Project system; demineralization of local and imported waters; and new facilities for regional brine disposal. The proposed CRW Salinity Reduction Partnership would complement near-term operational, regulatory, and perhaps legislative actions with technological research that could expand salinity management options for the future.

A proposed schedule for the CRW Salinity Reduction Partnership is shown in Figure 1. Staff will provide semi-annual updates to the Board and to the Member Agency Advisory Group (which is currently being formed). Board policy decision points are also shown on the proposed schedule. These decision points will allow your Board to review project status and to determine whether the project should be modified or discontinued.

CEQA COMPLIANCE / ENVIRONMENTAL DOCUMENTATION

Approval of the recommendation will not, in and of itself, have any environmental effects. When and as specific steps are proposed for implementation, your Board will be requested to comply, as appropriate, with the California Environmental Quality Act. This program is exempt because it consists of basic data collection, research, experimental management, and resource evaluation activities not resulting in a serious or major disturbance to an environmental resource (Title 14 CCR Sec. 15306).

FINANCIAL ANALYSIS:						
Evaluation Period: <u>5</u> years						
A. Projected Costs (Capital and O&M):						
	THRU FY 97-98	THRU FY 98-99*	THRU FY 99-00*	ACTUAL THRU FY 97-98	<u>OUT YEARS *</u>	<u>TOTAL</u>
Labor/Additives	\$130,600	\$1,008,500	\$1,925,300	\$0	\$2,366,500	\$5,430,900
Professional Services	15,800	110,300	231,500	0	185,400	\$543,000
Other**	164,100	953,300	2,335,600	0	3,091,500	\$6,544,500
Contingency	30,200	290,100	661,400	0	831,200	\$1,812,900
Contracts	(94,500) ⁺	0	231,500	0	294,200	\$431,200
TOTAL	\$246,200	\$2,362,200	\$5,385,300	\$ 0	\$6,768,800	\$14,762,500
B. Projected Savings:						
	THRU FY 97-98	THRU FY 98-99	THRU FY 99-00	ACTUAL THRU FY 97-98	<u>OUT YEARS</u>	<u>TOTAL</u>
Labor/Additives	\$0	\$0	\$0	\$0	\$0	\$ 0
Professional Services	0	0	0	0	0	\$ 0
Other	0	0	0	0	0	\$ 0
TOTAL	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
C. Difference (B-A)	(\$246,200)	(\$2,362,200)	(\$5,385,300)	\$ 0	(\$6,768,800)	(\$14,762,500)

Payback Period: N/A Years	Estimated Life of Project: 5 Years
Assumptions:	
* These estimates are for budgetary purposes only and reflect a comprehensive approach. No outside funding is shown for these years; however, additional funding will be aggressively pursued. The project will only continue forward if favorable results are obtained during the first year of testing and if Board approval is obtained.	
** Costs in this category include materials, operating equipment, incidental expenses, and administrative overhead.	
+ Does not include \$100,000 from AWWARF in a pending proposal.	

FIGURE 1. Proposed CRW Salinity Reduction Partnership Schedule

TASK	FY 97-98				FY 98-99*				FY 99-00*				FY 00-01*				FY 01-02*				FY 02-03
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Raise Money/Obtain Partners	█				█				█												
Preliminary Bench/Pilot Studies	█																				
Pilot/Demo Studies					█				█												
Preliminary Prototype Design					█																
Prototype Design/Construction									█				█								
Prototype Operation/Evaluation													█				?				
Member Agency Advisory Group Meetings		█		█		█		█		█		█		█		█		█		█	
Board Briefings			█				█				█				█				█		
Board Policy Decision Points Project Approval Recommendations for Future Testing/Construction	█						█				█				█				█		█

* Efforts in these years are subject to modifications based on results from the first year of work, the amount of outside funding received, and input from the Member Agency Advisory Group.