

Affordable Desalination Profiles State of the Art SWRO March 27, 2008

Ventura, CA (March 27, 2008) – The Affordable Desalination Collaboration (ADC) has completed a major milestone in their test program that profiles the state of the art performance for seawater reverse osmosis (SWRO) technology. This testing ran over two years and involved operating six sets of standard 8” diameter membranes in seven element pressure vessels including the, FILMTEC SW30HR-380, SW30XLE-400i, SW30HRLE-400i, Toray TM800-400, Koch 400 and Hydranautics SWC5. All other associated equipment and designs used in these tests also represented state of the art, off the shelf technology. Key system variables of recovery and flux ranged from 43-50% and 6-10 gallons per day per square foot of membrane (gfd). The testing provides a body of data that can be used to define and project the performance of state of the art SWRO for Southern California applications as well as a bench mark for the performance of new technologies and designs.

Table 1. ADC Power Consumption and System Projections

Treatment Step	kWh/kgal over various system capacities				
	ADC Record	ADC MAP	0.3 mgd(2)	10 mgd(2)	50 mgd(2)
RO Process	6.0*	7.6 (1)	10.5	8.6	7.6
Intake (2)	2.48	2.19	2.01	1.74	1.72
Pre-filtration (2)	1.30	1.15	1.06	0.91	0.90
Permeate treatment (2)	0.25	0.25	0.23	0.17	0.16
Permeate distribution (2)	1.27	1.27	1.17	0.86	0.85
Total Treatment	11.3	12.4	15.0	12.3	11.3

1. Most Affordable Point (MAP) average value from 6 membrane tests. 2. Projected values based on typical parameters and conditions. 3. * actual ADC operating conditions.

Table 1 shows that the record low specific process power achieved for SWRO was 6.0 kWh/kgal and the average MAP was 7.6 kWh/kgal. It also provides projections for the power consumption of various sized systems up to 50 million gallons per day (mgd) and some associated projected treatment requirements for full scale operation.

Table 2. ADC Operating Parameters and Performance

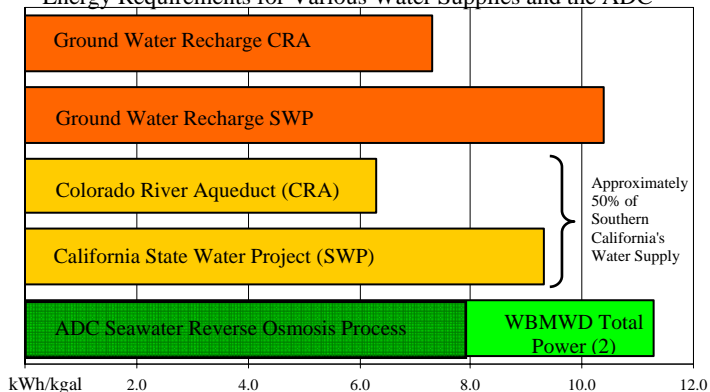
Process Variables	(*)	(1)	(1)	(1)	(1)
System capacity, mgd	0.05	0.08	0.3	10	50
RO feed pressure, psi	675	885	885	885	885
Flux, gfd	6.0	9.0	9.0	9.0	9.0
RO recovery, %	42%	48%	48%	48%	48%
Permeate quality, TDS	312	156	156	156	156
Permeate Boron, mg/l	1.0	0.8	0.8	0.8	0.8
Raw water, TDS	31,570	31,742	31,742	31,742	31,742
Raw water temperature, °F	59	60	60	60	60

Pounds per square inch (psi), Total dissolved solids (TDS), milligrams per liter (mg/l)

Table 2 provides figures on the associated key system parameters and performance from the ADC pilot with these values also projected over various system capacities. According to the ADC’s 50 mgd net present value model (see Data page on ADC web site for the NPV model details), the projected cost of water over the 6 MAP’s ranged from \$2.37-2.47/kgal with an average of \$2.43/kgal.

The ADC’s mission is to demonstrate affordable, reliable and environmentally responsible reverse osmosis desalination technologies and to provide a platform by which cutting edge technologies can be tested and measured for their ability to reduce the overall cost of the SWRO treatment process. The graph below compares results from the ADC’s data projected against the energy consumption of other sources of water for Southern California. These results are now being used as the base line to plan for projects such as West Basin Municipal Water District’s 20 MGD ocean desalination facility. Our results demonstrate that SWRO can be competitive with other traditional sources of water in Southern California.

Energy Requirements for Various Water Supplies and the ADC



1. ADC Seawater Reverse Osmosis Process power is from the ADC’s demonstration facility at the “most affordable point” and for the SWRO process only. This includes the power of the main HP pump and PX booster pump only with no allowance for intake, pre-filtration, conveyance or distribution. 2. WBMWD Total Power includes intake, pre-filtration, SWRO Process, conveyance and distribution power for their proposed 20 MGD ocean desalination facility.

The ADC is a non-profit organization comprised of the following group of leading companies, state and government agencies:

- California Department of Water Resources
- California Energy Commission
- Carollo Engineers
- City of Santa Cruz Water Department
- Energy Recovery, Inc.
- FilmTec Corporation
- GE Zenon
- Hydranautics – A Nitto Denko Company
- Koch Membranes
- Metropolitan Water District of Southern California
- Naval Facilities Engineering Service Center
- Pentair Water Treatment-CodeLine Division
- Poseidon Resources
- Sandia National Laboratories
- Toray Membranes
- U.S. Bureau of Reclamation
- West Basin Municipal Water District

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