

Duke Energy selects HERO™ Membrane Process for ZLD Application

The Facility

The Arlington Valley Power station being developed by DENA is a large combined cycle power plant located in Arlington, Arizona.

Duke/Fluor Daniel (DFD) of Houston, Texas are owner engineers and contractors. DFD were instrumental in selecting the HERO™ route for its economy, ease of operation and reduced operating costs. DFD obtained their permitting based on consideration of RO system followed by an evaporation pond.

The Problem

The cooling tower blow down volume is about 1675 gpm saturated with silica, high hardness and other constituents. A thermal brine concentrator for this capacity will be a costly affair in addition to high power and operating costs. A conventional membrane process can not function under these conditions due to silica and other organic limitation. The permitting of the power plant was based on evaporation pond. Customer actively considered the HERO™ process from the very begin-



ning of design conceptualization with a small evaporation pond. Notice should be taken of the fact that the cooling tower circulating water chemistry was based on 10500 PPM TDS.

The Solution

HERO™ is a Patented process which addresses the treatment of high silica, organic and bio active feed water and hence treatment of cooling tower blow down enabling recovery and reuse of the blow down water. The HERO™ process is limited only by the system osmotic pressure. HERO™ is a membrane process with modified pre treatment scheme to accommodate high silica concentrations. HERO™ has been successfully tested with silica level of 2000 PPM in the reject. Waste-water recovery with HERO™ process is limited only by osmotic pressure. Due to high TDS of 10500 PPM in the circulating water the HERO™ system was designed for a recovery of 88 %. A second pass R.O. treats a small portion of the HERO™ product followed by a mixed bed exchanger to produce DM water for boiler feed purpose. Bulk of the HERO™ product water is returned to the cooling tower cold well thus increasing the cycles of concentration.



Aquatech International Corporation

One Four Coins Drive; Canonsburg, PA 15317 USA

T: 724-746-5300

F: 724-746-5359

aic@aquatech.com

www.aquatech.com



PROJECT PROFILE SERIES # 002

Cooling Tower Blowdown Chemistry

DESIGN WATER ANALYSIS

Calcium (Ca ⁺⁺) as CaCO ₃	337.8	pH	7.8
Magnesium (Mg ⁺⁺) as CaCO ₃	120	Temperature, °F	100
Sodium (Na ⁺) as CaCO ₃	7939	Other contaminants:	
Potassium (K ⁺) as CaCO ₃	78	Suspended solids	50
Alkalinity as CaCO ₃	207		
Sulfate (SO ₄ ²⁻) as CaCO ₃	2192		
Chloride (Cl ⁻) as CaCO ₃	5721		
Silica as SiO ₂	123		

The plant is 2 x 50% capacity based on peak load capacity.

