

TECHNICAL TOUR INFORMATION

Tampa Bay Seawater Desalination Plant Tour

Sunday, May 23, 2010

3:00 pm – 5:00 pm

Fee: \$45

The Tampa Bay Seawater Desalination Plant is currently the largest operating seawater desalination plant in North America. The 30,000 square-foot plant is located on 8.5 acres next to Tampa Electric's Big Bend Power Station in Apollo Beach, which already withdraws and discharges up to 1.4 billion gallons a day of seawater from Tampa Bay for cooling water. The plant is designed to divert approximately 44 million gallons a day (mgd) from Tampa Electric's power plant cooling system. Upon entering the desal plant, the water goes through a rigorous pretreatment process. Then, the reverse osmosis process separates 25 mgd of freshwater from seawater. The remaining 19 mgd of concentrated seawater is blended back into the power plant's cooling system before being returned to the Bay.

The Tampa Bay Seawater Desalination Plant is an important part of the Tampa Bay region's water supply, providing up to 10% of the region's drinking water needs. Fully operational since December 2007, this facility provides a sustainable, environmentally friendly, drought-proof supply of drinking water for Tampa Bay Water member governments' utility customers.

• MONDAY, MAY 24, 2010 •

8:00 am - 3:00 pm

Registration Open

8:00 am – 8:30 am

Continental Breakfast

OPENING SESSION

8:30 am – 8:45 am

Welcome and Opening Remarks

Mr. David Moore, Chair, WateReuse Foundation

8:45 am – 9:10 am

Keynote Speaker

Congressman C.W. Bill Young (R-FL) - Invited

9:10 am – 9:30 am

EPA's Research in Water Reuse

Dr. Christopher Impellitteri, Environmental Protection Agency

9:30 am – 9:50 am

Water Reuse and Desalination Research in Australia

Mr. Adam Lovell, Water Services Association of Australia

9:50 am – 10:15 am

Networking Break

RESEARCH CHALLENGES IN FLORIDA

10:15 am – 10:40 am

Assessment of Nutrient Levels and Potential Markers in Selected Reclaimed Waters

Dr. Joseph Jacangelo, MWH and The Johns Hopkins University

10:40 am – 11:05 am

Concentrate Minimization Study for South Florida

Dr. Sandeep Sethi, Carollo Engineers

11:05 am – 11:30 am

Solving the ASR Arsenic Problem: Pilot-Tested Approach Shows Promising Results

Ms. Barika Poole, CDM

11:30 am – 11:55 am

Pilot Scale Research for Meeting Extreme Nutrient Requirements for Indirect Potable Reuse in the City of Plantation

Mr. Richard Cisterna, Hazen & Sawyer

12:00 pm – 1:15 pm

AWARDS LUNCHEON

INNOVATIONS IN WATER REUSE

- 1:15 pm – 1:40 pm** Innovative Approaches to Optimizing Sulfuric Acid Consumption at West Basin Municipal Water District
Mr. Wyatt Won, West Basin Municipal Water District
- 1:40 pm – 2:05 pm** An Investigation of Commercially Available Membranes for the Production of Osmotic Energy
Mr. Mark Donovan, Separation Processes, Inc.
- 2:05 pm – 2:30 pm** Use of Ceragenins to Create Novel Biofouling Resistant Water-Treatment Membranes
Dr. Susan Altman, Sandia National Laboratories
- 2:30 pm – 2:55 pm** Fluorescent Fingerprinting of Dissolved Organic Matter as a Monitoring Tool in Reclaimed Water Systems
Mr. R.A. Polera, University of North Carolina at Chapel Hill
- 2:55 pm – 3:15 pm** **Networking Break**
- 3:15 pm – 3:40 pm** Evaluation of NF and LPRO for Maximizing Recovery of Recycled Water for Groundwater Recharge at the Water Replenishment District of Southern California
Dr. Christopher Yu, Psomas
- 3:40 pm – 4:05 pm** Pilot-Scale Evaluation of an MBR – Ozone – RO System for Water Reuse
Dr. Benjamin Stanford, Hazen & Sawyer
- 4:05 pm – 4:30 pm** Comparison of RO Membrane Performance: From Qualification Testing to Full Scale Application at West Basin MWD
Ms. Wendy Broley, Separation Processes, Inc.
- 5:00 pm – 6:30 pm** **Welcome Reception**

INNOVATIONS IN DESALINATION

- Desalination Research at the Water Research Foundation
Mr. Chris Rayburn, Water Research Foundation
- The Economics of Desalination: A Critical Review and Evaluation of What it Costs to Implement Desal
Dr. Robert Raucher, Stratus Consulting
- Potential Impacts of Harmful Algal Blooms on Ocean Water Desalination
Mr. Phil Lauri, West Basin Municipal Water District
- Selective Recovery of Desalination Concentrate Salts using Interstage Ion Exchange
Mr. Joshua Goldman, University of New Mexico
- A Novel Saltwater AOC Assay for Optimizing Desalination R/O Pretreatment
Ms. Lauren Weinrich, American Water
- Pilot Testing Pre-formed Chloramines for Biofouling Control in Ocean Water Desalination
Dr. R. Shane Trussell, Trussell Technologies, Inc.
- Zero Liquid Discharge Desalination: Results from a Water Research Foundation Project Conducted in Florida
Mr. Rick Bond, Black & Veatch

MONDAY SESSION DESCRIPTIONS

RESEARCH CHALLENGES IN FLORIDA

Assessment of Nutrient Levels and Potential Markers in Selected Reclaimed Waters

Dr. Joseph Jacangelo, MWH and The Johns Hopkins University

A potential unintended consequence of water reclamation practices is nitrogen and phosphorous loading into waterways. Consequently, a nutrient survey of selected water reuse plants in Florida was conducted. A variety of organic and inorganic compounds and selected metals were evaluated as markers for the targeted nutrients.

Concentrate Minimization Study for South Florida

Dr. Sandeep Sethi, Carollo Engineers

The study evaluated alternatives for concentrate minimization in South Florida. Evaluations were performed for representative RO plants to assess recovery limiting salts, promising concentrate treatment/minimization alternatives, and associated costs and implementation factors. The dual RO with intermediate chemical precipitation approach was pilot tested at one site and demonstrated stable performance.

Solving the ASR Arsenic Problem: Pilot-Tested Approach Shows Promising Results

Ms. Barika Poole, CDM

Challenges implementing ASR have discouraged utilities from developing this tool, as studies have shown that injecting water with higher dissolved oxygen and ORP than native groundwater may release arsenic into the stored water. This presentation will discuss testing results of a pretreatment system and its effects on arsenic leaching.

Pilot Scale Research for Meeting Extreme Nutrient Requirements for Indirect Potable Reuse in the City of Plantation

Mr. Richard Cisterna, Hazen & Sawyer

Many utilities in water stressed regions of the country are considering indirect potable reuse applications that could impact surface water bodies. As such, nutrient limitations are becoming increasingly important for some projects. This presentation will review the growing nutrient challenges and present the City of Plantation, FL pilot test results for meeting nitrogen limits < 1.5 ppm and phosphorous < 0.02 ppm.

INNOVATIONS IN WATER REUSE

Innovative Approaches to Optimizing Sulfuric Acid Consumption at West Basin Municipal Water District

Mr. Wyatt Won, West Basin Municipal Water District

West Basin MWD investigated four separate strategies for optimizing costs associated with calcium phosphate scale control in their RO reuse applications. This presentation will provide performance data and compare the economics of the four strategies, which include more frequent cleaning, periodic pH cycling, and seasonal pH adjustments.

An Investigation of Commercially Available Membranes for the Production of Osmotic Energy

Mr. Mark Donovan, Separation Processes, Inc.

This presentation shows the results of a laboratory scale investigation of commercially available membranes for the production of osmotic energy. Experiments were run on four different types of commercially available membranes to determine the technical and economic feasibility of using these membranes to generate osmotic energy.

Use of Ceragenins to Create Novel Biofouling Resistant Water-Treatment Membranes

Dr. Susan Altman, Sandia National Laboratories

Ceragenins have been shown to decrease biofilm formation on a reverse osmosis membrane by over 90%. Ceragenins are synthetically produced antimicrobial peptide mimics that display broad-spectrum bactericidal activity. Creation of biofouling resistant membranes will assist in creation of clean water and energy with lower energy usage.

Fluorescent Fingerprinting of Dissolved Organic Matter as a Monitoring Tool in Reclaimed Water Systems

Mr. R.A. Polera, University of North Carolina at Chapel Hill

This research provides a new monitoring approach based on distinct fluorescence signatures of reclaimed and potable water, such that it can be broadly applied to different water reclamation systems to enhance monitoring of treatment processes and the distribution system; ultimately preventing contamination events that are potentially harmful to public health.

Evaluation of NF and LPRO for Maximizing Recovery of Recycled Water for Groundwater Recharge at the Water Replenishment District of Southern California

Dr. Christopher Yu, Psomas

Due to their promising higher recovery and permeate flux while providing a product water quality comparable to RO membranes, new generation, low-fouling NF and LPRO membranes have been evaluated and field tested for recycled water application. This presentation is to discuss the operational issues and cost implications associated with using these membranes at the Water Replenishment District of Southern California for groundwater recharge.

Pilot-Scale Evaluation of an MBR – Ozone – RO System for Water Reuse

Dr. Benjamin Stanford, Hazen & Sawyer

Ozone and other oxidation/advanced oxidation processes have the potential to change the nature and behavior of dissolved/effluent organic matter and reduce the fouling associated with such material in RO membranes used for water reuse. This presentation will summarize the bench scale testing data and will provide an overview of the current pilot scale testing for a novel MBR-Ozone-RO reuse system.

Comparison of RO Membrane Performance: From Qualification Testing to Full Scale Application at West Basin MWD

Ms. Wendy Broley, Separation Processes, Inc.

Reverse osmosis membranes are not created equal when it comes to treating microfiltered municipal effluent. West Basin MWD has employed rigorous qualification testing to allow acceptable RO membranes to be bid on new and replacement installations. The presentation will detail the test procedure, results, and compare with full-scale performance.

INNOVATIONS IN DESALINATION

Desalination Research at the Water Research Foundation

Mr. Chris Rayburn, Water Research Foundation

For over 20 years, Water Research Foundation (formerly AwwaRF) has sponsored applied desalination research projects for our utility members. As desalination has emerged from a small scale technology to a critical supply component for many large municipal utilities, the Foundation's research has broadened to address the challenges of incorporating desalination into existing utility processes and operations. This has been accompanied by increased investment in more fundamental desalination research that represents first steps toward potential breakthroughs in desalination science and technology. As desalination R+D activities have increased in the US and abroad, the Foundation has played a central role in ensuring effective coordination and collaboration among desalination R+D stakeholders.

The Economics of Desalination: A Critical Review and Evaluation of What it Costs to Implement Desal

Dr. Robert Raucher, Stratus Consulting

For a variety of reasons, it has been difficult to compile a set of valid and useful estimates of the true cost of desal projects and of desal water (e.g., on a \$ per kgal or \$ per acre-foot basis). As more desal projects get implemented in the U.S., Australia, and elsewhere, it is possible and useful to have a careful compendium compiled of the complete (full accounting) costs for capital and other one-time project development outlays, and of annual operation and maintenance costs (including energy, chemicals, and labor). Based on a soon-to-be-completed Water Research Foundation project, this presentation will report results that attempt to accurately show (and interpret) the complete costs by cost category, by desal project component (e.g., membrane processes, concentrate management), and also in terms of the full cost per volume of product water produced.

Potential Impacts of Harmful Algal Blooms on Ocean Water Desalination

Mr. Phil Lauri, West Basin Municipal Water District

One of the most significant challenges faced in ocean water desalination are the impacts of harmful algal blooms. This presentation will present a summary of the algal biotoxins that have been identified, but will focus on the demonstrated removals achieved by pilot and bench-scale testing of the relevant toxins in Southern California.

Selective Recovery of Desalination Concentrate Salts using Interstage Ion Exchange

Mr. Joshua Goldman, University of New Mexico

The presentation will present findings from a research project focused on the selective recovery of salts from RO concentrate, using ion exchange as an intermediate step in an RO system. Benefits include increased potable water recovery, the generation of salts that might have commercial value, and reduced concentrate volume.

A Novel Saltwater AOC Assay for Optimizing Desalination R/O Pretreatment

Ms. Lauren Weinrich, American Water

A method measuring assimilable organic carbon (AOC) was developed using a naturally luminescent marine organism and is an important tool to evaluate the biofouling potential in desalination pretreatment. AOC levels from jar tests of coagulants and from various treatment points in both pilot and full scale desalination facilities is discussed.

Pilot Testing Pre-formed Chloramines for Biofouling Control in Ocean Water Desalination

Dr. R. Shane Trussell, Trussell Technologies, Inc.

This work presents pilot-scale results of preformed chloramines for biofouling control in ocean water desalination. Because the chloramines are formed prior to their addition to the ocean water, the strong oxidant bromamine does not form and the benefits of maintaining a chloramine residual for biofouling control can be realized.

Zero Liquid Discharge Desalination: Results from a Water Research Foundation Project Conducted in Florida

Mr. Rick Bond, Black & Veatch

A Water Research Foundation project is being conducted to evaluate zero liquid discharge (ZLD) desalination. This paper discusses one of the ZLD approaches evaluated, RO combined with electro dialysis metathesis (EDM) and MIEX. EDM is innovative modification of electro dialysis that has the potential to reduce the cost and energy consumption for ZLD.