

69th Annual International Water Conference 2008

**San Antonio, TX
26-30 October 2008**

Volume 1 of 2

ISBN: 978-1-60560-992-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2008) by the Engineers Society of Western Pennsylvania
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact the Engineers Society of Western Pennsylvania
at the address below.

Engineers Society of Western Pennsylvania
Pittsburgh Engineers Building
337 Fourth Avenue
Pittsburgh, Pennsylvania 15222

Phone (412) 261-0710
Fax: (412) 261-1606

www.eswp.com

TABLE OF CONTENTS

VOLUME 1

CONDENSATE POLISHING

Condensate Polishing For Nuclear And Super Critical Power Plants For The 21ST Century	1
<i>Robert Applegate, Al Tavares</i>	
Condensate Polishing System Upgrade with Melt-blown, Reverse Gradient, Backwash Filter Septa	17
<i>Kal Farooq</i>	

CURRENT CHALLENGES FACING NUCLEAR POWER PLANTS

The Evolution of Water Processing Technology at Diablo Canyon Nuclear Power Plant	22
<i>Sandy Schexnailder</i>	
Effective Treatment Programs To Control Corrosion and Fouling In Once-Through Nuclear Service Water Systems	31
<i>Peter Ten Eyck, George Peabody</i>	
Water Management Practices in Nuclear Power Plants – Controlling and Monitoring Nutrients in Discharge Streams	43
<i>Tony Banks, Cuong Truong, Gomes Ganapathi, Julius Isaac</i>	

MONITORING – THE KEY TO SUCCESSFUL WATER TREATMENT OPERATIONS

A Field Test for Rapid Detection of Legionella Pneumophila Serogroup 1 in Water Samples	55
<i>Andrew Cooper, Tom Lindley, Neil Polwart, Ross Grant, Howard Barnes, Eric Holmes</i>	
Novel Electrodeionization Devices: Applications in Inorganic Analysis	69
<i>John Riviello, Archava Siriraks</i>	
Update on the Steam Electric Power Effluent Guidelines	78
<i>Diane Martini</i>	
Diagnostics and Control of Scale and Corrosion Stress in a 500 HP Steam Generating System using New Fluorescence and Oxidation-Reduction Technology	89
<i>Martin Godfrey, Richard Peterson, Stephen Mori</i>	

SIGNIFICANCE OF HYDROXIDE ALKALINITY CONTROL IN STEAM GENERATION SYSTEMS, A PANEL DISCUSSION SPONSORED BY THE ASME RESEARCH COMMITTEE ON WATER AND STEAM IN THERMAL SYSTEMS

Phosphate is Practically Caustic?	98
<i>James Bellows</i>	
Silica in Steam Generating Systems	102
<i>Edward Beardwood</i>	

An Introduction to Alkalinity Limits for Boiler Water Treatment	120
<i>Robert Bartholomew</i>	
Sodium Hydroxide in Steam Turbines	135
<i>James Bellows, Sudhir Rajagopalan</i>	

KEYNOTE SESSION

The Future of the Water Treatment Industry: The Vision of a Committed Partner	147
<i>Jean-Michel Herrewyn</i>	

ACHIEVING SUSTAINABILITY THROUGH WATER RECYCLE/REUSE

Design Challenges in Implementing Water Management Controls: A New Look at Water Recycle and Reuse in Power Plants	165
<i>Lisa Bennett, Kumar Sinha</i>	
Flue Gas Condensate and Energy Recovery	182
<i>Milan Tepler, Jonathan Wood, Patrick Buzzell</i>	
Reclaimed Water Use as Cooling Tower Makeup - The Ongoing Challenge	189
<i>Timothy Eggert, Gary Geiger</i>	

LEGIONELLA – REGULATION, RISK MANAGEMENT AND REDUCTION

Practical Operation of the Victorian Legionella Legislation Over 6 Years - From an Auditor's Perspective	202
<i>Peter Roberts</i>	
Lessons Learned from the Implementation of Biocide Strategies in Cooling Towers	211
<i>Dave Christophersen, Karim Essemiani, Alain Vidal, Sandrine Oberti</i>	
Cooling Towers, Drift, and Legionellosis	221
<i>Thomas Bugler, John Lane, Richard Miller, Barry Fields</i>	

PRETREATMENT

Single-stage Vacuum Deaeration Technology for Achieving Low Dissolved Gas in Process Water	238
<i>Glenn Harbold, Jonathan Park</i>	
Emerging Water Quality Issues in Combustion Turbine Evaporative Coolers	243
<i>Daniel Robinette, Charlie Nichols</i>	
Electropositive Filtration Technology in Automobile Manufacturing Applications	254
<i>Henry Frank, Rick Lancaster</i>	
Iron Specific Resin, A Novel Technique and An Excellent Choice For Removal of Iron from Ground Water	267
<i>Renu Saraf</i>	

**WATER TREATMENT IN HYDROCARBON PROCESSING AND
CHEMICAL PROCESSING STEAM SYSTEMS – PRACTICAL
ANSWERS TO YOUR QUESTIONS, A SESSION SPONSORED BY THE
ASME RESEARCH COMMITTEE ON WATER AND STEAM IN
THERMAL SYSTEMS**

Steam Reboilers - The Good, The Bad and The Ugly	280
<i>Douglas Dewitt-Dick</i>	
Condensate Polishing and Reclamation in Hydrocarbon Processing and Chemical Processing Steam Plants	292
<i>Robert Holloway</i>	
Industrial Steam Purity: Requirements, Proper Sampling and Practical Considerations	304
<i>Anton Banweg</i>	
Effective Monitoring and Control in Steam Generating Systems	308
<i>Irvin Cotton</i>	

**CHALLENGES IN DEALING WITH FLUE GAS DESULFURIZATION PURGE
WASTEWATERS**

Mercury Treatment in Flue Gas Desulfurization Wastewater Development Program Update	333
<i>Michael Pudvay, Enos L. Stover</i>	
Full Scale Operation of Biological Technology for the Removal of Selenium from FGD Wastewaters	343
<i>Jill Sonstegard, Tim Pickett, James Harwood, Danny Johnson</i>	
Duke Energy-Carolina's Strategy, Project Execution and Initial Experience	357
<i>Robert Wylie, Richard Baker, William Kennedy, Michael Riffe, Brian Heimbigner</i>	
ZLD Systems Installed for ENEL Power Plants in Italy	383
<i>Nageswara Rao, Sergio Donadono</i>	

CHALLENGES IN PRODUCED WATER TREATMENT

Resin Cleaning of SAC and WAC Resins in SAGD - Enhanced Oil Recovery (EOR) Applications	393
<i>Claude Gauthier, Kevin Depner, Michael Mayne</i>	
Profiling and Minimization of WAC (Weak Acid Cation) and SAC (Strong Acid Cation) Regenerant Waste Through Conductivity Recycling	403
<i>Guy Mommaerts, Melonie Myszczyzyn</i>	
Alkalinity, the Joker in the Pack	417
<i>Michael Bridle,</i>	
Treatment of Coal Bed Methane Produced Water Using Short Bed Ion Exchange	429
<i>Michael Sheedy, Paul Robinson</i>	

**COOLING SYSTEM OPTIMIZATION – THE LATEST IN MANAGEMENT AND
CONTROL ALTERNATIVES (I)**

Unique Cooling Water Exchanger Inspection Technique	439
<i>Chris Friesen</i>	

A New Aid for Managing Biofouling in Cooling Systems	447
<i>Charles Ascolese</i>	

VOLUME 2

Solid Chemical Programs for Scale and Corrosion Control in Cooling Water Systems: Delivering Sustainable Development	458
<i>Steven Bilek, Barbara Moriarty, Nathaniel Greene, Robert Walicki</i>	
Cooling Water Hardness and Chloride Reduction (A Novel Chemical Treatment)	467
<i>Al Yeoman, Sam Owens</i>	
Utilization of Salt Water as the Source for Make-Up Water in Wet Cooling Towers	478
<i>Natasha Jones, Luc De Backer, ,</i>	

ION EXCHANGE

Dual Functionality Acrylic Anion Resin in a Demineraliser System - A Case Study at Interquisa Canada	491
<i>Christian Beaule, David Boulanger</i>	
Ion Exchange Applications of Simulation Technology	502
<i>Michael Gottlieb</i>	
Resin Simulator Discussion	513
<i>Kyle Smith, Jim Summerfield</i>	
Squeezing a Few More Years of Life from a 30+ Year Old Packed Bed Demineralizer	523
<i>Peter Meyers</i>	
Innovations in Ion-Exchange Technology for the Removal of Sulphate	533
<i>David Kratochvil, Brad Marchant, Michael Bratny, Rick Lawrence,</i>	

APPROACHES TO MINIMIZING MEMBRANE FOULING

Comparing Conventional and Membrane Pre-Treatment on Seawater Osmosis Desalination Plants	543
<i>Paul Choules</i>	
Ultra Filtration Improves Performance of RO Unit Treating Cooling Tower Blow Down in a Zero Liquid Discharge (ZLD) Plant	555
<i>Venkat Jagannathan, Ramiro Rivera, Carlos Alequin</i>	
Auditing a Reverse Osmosis System	566
<i>Jane Kucera</i>	

COOLING SYSTEM OPTIMIZATION – THE LATEST IN MANAGEMENT AND CONTROL ALTERNATIVES (II)

Puckorius Scaling Index as Applied to Dolphin (Pulsed Power) Non-chemical Water Treatment	576
<i>David Alley, Paul Puckorius</i>	
Defining Green Technology in Water Treatment for Cooling Water Systems	590
<i>James Green</i>	

A New Framework for the Management of Cooling System Dynamics	603
<i>Donald Johnson, Geoff Townsend</i>	

Design & Construction of a Riverbank Filtration Cooling Water Supply for an IGCC Station	620
<i>Henry Hunt</i>	

PRODUCED WATER

Innovations in Produced Water Treatment for SAGD	631
<i>Dorothy Neu, Mark Nicholson, Keith Minnich</i>	

Technical Advancements in SAGD Evaporative Produced Water Treatment	642
<i>William Heins</i>	

An Innovative Approach for Processing “SAGD” Produced water	653
<i>Rafique Janjua</i>	

WASTEWATER TREATMENT IN RECYCLE/REUSE SYSTEMS

Unique Wastewater Processing Application at River Bend Nuclear Station	662
<i>Tracy Barker, Jim Braun</i>	

Wastewater Treatment Challenges from an Ethanol Plant Recycle System	663
<i>Thomas Lawry</i>	

Sustainable Wastewater Reuse – Water Quality Modeling for Near ZLD	673
<i>Prit Kotecha</i>	

Water Conservation at Lindsay Olive Growers	680
<i>Naomi Levy</i>	

COMMISSIONING HIGH PRESSURE POWER PLANTS

Challenges in Meeting Condensate, Feedwater, and Steam/Water Quality Limits during Startup and Commissioning of Multi Pressure Combined Cycle Power Plants-EPC Perspective	691
<i>Christopher Huth, Kumar Sinha</i>	

ADVANCES IN REFINERY WASTEWATER TREATMENT

Oil / Water Separation Techniques Applied to Circular Designs	722
<i>Tyson Gollaher, Jim Woods, Rick Szilagy</i>	

Storage Tank Internal Floating Roofs Description and Selection Guidelines	730
<i>Michael Doxey</i>	

Integrated Fixed-Film/ Activated Sludge (IFAS) for Refinery and Petrochemical Wastewater Treatment Plant Upgrades	740
<i>Casey Mueller, Russ Grillo, Ramesh Kalluri, Sarah Hubbell, Wayne Flournoy</i>	

Evaluating Impacts of FCCU Scrubber Purge Water Discharges on Refinery Biological Treatment	748
<i>Frank Castaldi, Jeff Allen</i>	

RECYCLE/REUSE ALTERNATIVES FOR POTW APPLICATIONS

Keeping it Green at the Landfill - Cogeneration, Evaporation and Membrane Technology for the Treatment of Landfill Leachate	761
<i>Cristina Del Piccolo, Tina Masters Odum</i>	
Design Considerations for Upgrading POTWs to Treat Power Plant Wastewater Discharges	777
<i>Brian Aylaian, Hong Yin</i>	
Technical Assessment of Water Reuse in Consideration of Emerging Pollutants	788
<i>Christopher Stacklin, Jerry Evangelista</i>	
Water Conservation Strategies at Electric Generating Stations	807
<i>Andrew Markle</i>	

ZERO LIQUID DISCHARGE (ZLD) TECHNOLOGIES AND APPLICATIONS

Achieving Reliable Zero Liquid Discharge (ZLD) Treatment of Gray Water at a Integrated Gasification Combined Cycle (IGCC) Power Plant	819
<i>Lanny Weimer, Carolina Gonzalez, Robert Solomon</i>	
Evaporation of Wastewaters Containing Highly Soluble Salts	827
<i>William Shaw</i>	
Navajo Generating Station – 25 Years of Zero Liquid Discharge (ZLD)	844
<i>Robert Peterson, Jerry Koger, Timothy Rittorf</i>	
Use of High Efficiency Reverse Osmosis (HERO), Brine Concentration and Crystallization at the World's First Two Zero Liquid Discharge (ZLD) Ethanol Plants	854
<i>Russell Vandenberg, Nimai Miller</i>	

TRACE CONTAMINATE REMOVAL

Porous Polymers Via Macroreticular Synthesis: Nature and Applications	863
<i>Robert Albright</i>	
Trace Contaminant Removal from Ground and Waste Waters with Selective and Non-Selective Media	889
<i>Robert Goltz</i>	

Author Index