

International Water Conference®

**Sponsored by the Engineers' Society of
Western Pennsylvania**

-The 71st Annual IWC-

**CONFERENCE
PROGRAM
GUIDE**

October 24-28, 2010

**Crowne Plaza Riverwalk Hotel
San Antonio, Texas, USA**

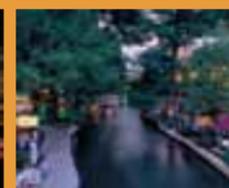


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Schedule-at-a-Glance

EXECUTIVE
SALON 1

EXECUTIVE
SALON 2

EXECUTIVE
SALON 4

SAN ANTONIO
BALLROOM

SUNDAY, OCTOBER 24

5:00-7:00 PM GET ACQUAINTED RECEPTION IN THE EXHIBIT HALL - TEXAS BALLROOM

MONDAY, OCTOBER 25

**ASME SESSION:
CONDENSATE POLISHING
SYSTEMS FOR POWER PLANTS**

**UNUSUAL TOPICS
IN WATER TREATMENT**

**INDUSTRIAL
WASTEWATER
TREATMENT**

**TRACE METALS /
SELENIUM REMOVAL**

11:15 AM

KEYNOTE SESSION

11:30 AM-2:00 PM EXHIBIT HALL HOURS AND LUNCHEON BUFFET - TEXAS BALLROOM

**NEW METHODS IN
BOILER ASSET PROTECTION**

FGD WASTEWATER

PRODUCED WATER 1

COOLING WATER 1

4:30-7:00 PM EXHIBIT HALL HOURS AND WELCOME RECEPTION IN THE EXHIBIT HALL - TEXAS BALLROOM

Schedule-at-a-Glance

TUESDAY, OCTOBER 26

8:00 AM-12 NOON

**REFINERY
WASTEWATER**

COOLING WATER 2

NUCLEAR

**ZERO LIQUID
DISCHARGE**

11:30 AM-2:00 PM

EXHIBIT HALL HOURS AND LUNCHEON BUFFET - TEXAS BALLROOM

1:30-5:00 PM

**MONITORING AND CONTROL
OF WATER CHEMISTRY IN
BOILER SYSTEMS**

PRETREATMENT

RECYCLE / REUSE

PRODUCED WATER 2

4:30-7:00 PM

EXHIBIT HALL HOURS AND WELCOME RECEPTION IN THE EXHIBIT HALL - TEXAS BALLROOM

WEDNESDAY, OCTOBER 27

8:00 AM-12 NOON

RO / MEMBRANE

**POWER PLANT WATER
SYSTEMS DESIGN**

**NATURAL GAS HYDRO
FRACTURING FLOW BACK
WATER TREATMENT**

**NON-CHEMICAL
COOLING WATER**

1:00-5:00 PM

CONTINUING EDUCATION WORKSHOPS - SEE PAGES 46-48 FOR DETAILED SCHEDULE

THURSDAY, OCTOBER 28

8:00 AM - 5:00 PM

CONTINUING EDUCATION WORKSHOPS - SEE PAGES 46-48 FOR DETAILED SCHEDULE

Monday's Sessions

CONDENSATE POLISHING SYSTEMS FOR POWER PLANTS WITH PANEL DISCUSSION SPONSORED BY THE ASME RESEARCH & TECHNOLOGY COMMITTEE

Date: Monday, October 25
Time: 8:00-11:00 AM
Room: Executive Salon 1

The ASME Research & Technology Committee on Water and Steam in Thermal Systems sponsored this session, which presents a series of three technical papers on condensate polishing and provides a forum for a panel discussion. The papers discuss a relatively new onsite amine regeneration procedure, offsite regeneration of condensate polisher resin, and leakage from condensate polishers. The ensuing panel discussion is designed to provide an opportunity for more in-depth discussions of questions and concerns regarding condensate polishing and filtration.

Session Chair: Robert Bartholomew, Sheppard T. Powell Associates LLC, Baltimore, MD
Discussion Leader: Deborah Bloom, Nalco Company, Naperville, IL
IWC Representative: David Simon, II, Cyrus Rice Water Consultants, Pittsburgh, PA

IWC 10-01

8:00 AM

DESIGN CONSIDERATIONS FOR CONDENSATE POLISHING OFF-SITE REGENERATION

Jerry Alexander, Siemens Water Technologies, La Canada, CA

In recent years, the use of off-site regeneration for existing deep bed condensate polishing plants as well as grass roots plants is being given greater consideration. The challenges of a retrofit design that converts an existing condensate polishing plant with on-site regeneration to off-site regeneration and that of a plant that is specifically designed for off-site regeneration system can differ. Both designs require careful attention be given to the unique requirements associated with each approach. The concept of external regeneration must place equal emphasis on the design of the system and the contract for the off-site regeneration service. The ability of the condensate polisher to produce the specified effluent water quality cannot be achieved unless both are in harmony. In this paper, we will discuss the design requirements for the two designs along with the resin movement and conditioning outside the condensate polishing system.

IWC 10-02

8:30 AM

AMINE FORM OPERATION OF DEEP BED CONDENSATE POLISHING ION EXCHANGE RESINS

Lewis Crone, Dominion Nuclear Connecticut, Inc., Waterford, CT

A process for converting and operating condensate polishing resins in the amine form has been implemented at Millstone Power Station. Resins operated in the ethanolamine form have demonstrated the same affinity for seawater-borne impurities as H-OH form resins, and are compatible with EPRI Guidelines limits for steam generator impurity concentrations.

IWC 10-03

9:00 AM

A REPORT ON RESIN SEPARATION AND BACKWASH EFFICIENCY OF MIXED BED ION EXCHANGE RESINS

William Moore, Aquatech, Canonsburg, PA; Bharathwaj Gopalakrishnan and Gary L. Foutch, School of Chemical Engineering, Oklahoma State University, Stillwater, OK

A condensate polisher is being provided for a new high pressure steam generation plant. The owner is not familiar with condensate polishing and wanted proof that the system would meet process guarantees, both in effluent quality and capacity. A pilot plant was constructed and operated by faculty and students at Oklahoma State University. The

Monday's Sessions

pilot plant consisted of three 12 inch diameter plexiglass tubes ten feet in height. Mixed bed resin was placed in the first tube and air mixed. Then the resin was backwashed using various flows and temperatures. Samples were taken and analyzed for cation in anion and anion in cation. The anion was transferred to the second tube and the heel was transferred to the third tube. Again samples were taken to check the amount of cross contamination in each transfer. In a separate experiment leakages and capacity were determined for various levels of cross contamination. The tests showed that cross contamination should be quite low and capacity and leakages will be acceptable.

Break	9:30 AM
Panel Discussion	9:50 AM
Conclusion	11:00 AM

UNUSUAL TOPICS IN WATER TREATMENT

Date: Monday, October 25

Time: 8:00-11:00 AM

Room: Executive Salon 2

This session will present papers on important developments relating to pollution control and corrosion inhibition. With the advent of emerging technologies in water and wastewater treatment, a paper will also be presenting discussing the latest developments in patent law relating to these technologies.

Session Chair: David A. Velegol, Chester Engineers, Moon Township, PA

Discussion Leader: Clifton McCann, Venable LLP, Washington, DC

IWC Representative: Kumar Sinha, P.E., Bechtel Power, Frederick, MD

Session Introduction

8:00AM

David A. Velegol, Chester Engineers, Moon Township, PA

IWC 10-04

8:10 AM

PATENT LAW DEVELOPMENTS THAT AFFECT WATER TREATMENT TECHNOLOGY

Clifton E. McCann and Lars H. Genieser, Ph.D. Venable LLP, Washington, DC

This presentation briefly outlines patent law basics, then reviews patent infringement cases of the past year that either involved or impacted water treatment technologies. It examines how company policies can be updated to more accurately identify and exploit patent opportunities and assess competitors' claims. Finally, it updates status of patent reform legislation.

Discusser: David A. Velegol, Chester Engineers, Moon Township, PA..... 8:35 AM

Closure & Floor Discussion 8:45 AM

IWC 10-06

9:00 AM

INTEGRATING POLLUTION PREVENTION AND WATER FOOTPRINT REDUCTION INITIATIVES

David Nystuen, SES Environmental, Fort Wayne, IN

Water footprint reduction and water pollution prevention programs at industrial manufacturing plants are key components of any corporate environmental sustainability initiative. Common to the success of both programs is the need to first develop a fundamental understanding of water usage and wastewater source characteristics throughout the plant. This paper describes a rigorous, systematic, baseline water assessment process referred to as Water Preservation and Pollution Prevention Program (WP4) that integrates water pollution prevention and water reduction objectives. Elements of WP4 include facility inspections, wastewater source sampling, flow monitoring, updating sewer mapping, water process flow diagramming, and developing a baseline water balance. WP4 is a

Monday's Sessions

flexible program that is easily tailored to site-specific conditions and has been successfully implemented at industrial manufacturing facilities in Canada, Mexico, Brazil, and across the United States.

Discusser: Nandan Vani, Bechtel Power Corporation, Houston, TX.....	9:25 AM
Closure & Floor Discussion.....	9:35 AM
Conclusion.....	9:50 AM

INDUSTRIAL WASTEWATER TREATMENT

Date:	Monday, October 25
Time:	8:00-11:00 AM
Room:	Executive Salon 4

Industrial wastewater dischargers are continually faced with mandates to improve the quality of their effluents, some regulatory in nature and some related to business incentives for effluent reuse and energy recovery. As evidenced by this year's industrial wastewater session, these mandates arise in Asia as well as North America. Biological treatment is a theme for the three papers on the program, either as the featured treatment process for key wastewater parameters, or as pre-treatment ahead of processes designed to upgrade final effluent quality. The session will include presentations on wastewater treatment in three different industries, including the payoff presentation for a "cliffhanger" paper presented last year on biological nitrogen removal.

Session Chair:	Paul Pigeon, P.E., Golder Associates Inc., Lakewood, CO
Discussion Leader:	Ajit Ghorpade, N.A. Water Systems LLC, Moon Township, PA
IWC Representative:	Bradley Wolf, P.E., Navigant Consulting, Pittsburgh, PA

Session Introduction 8:00 AM

Paul Pigeon, P.E., Golder Associates Inc., Lakewood, CO

IWC 10-07 8:10 AM

COMMISSIONING OF BIOLOGICAL NITROGEN REMOVAL FROM CHEESE PLANT WASTEWATER USING AN ALTERNATE CARBON

Eric Blumenstein, Paul Pigeon, and Pamela Edrich, Golder Associates Inc., Lakewood, CO; Joe Middlebrooks, Independent Consultant, Superior, CO; Sheldon Knapp and Douglas Pettinger, Glanbia Foods, Inc., Gooding, ID

Glanbia Foods operates a large cheese-making operation near Twin Falls, Idaho, which generates 1.25 million gallons per day (MGD) of high strength wastewater. In 2009, anoxic treatment of nitrogen, improved clarification, and sludge return and wasting improvements were built. Commissioning of anoxic nitrogen removal was accomplished with an alternate carbon source.

Discusser: Rafique Janjua P.E., Fluor, Houston, TX.....	8:35 AM
Closure & Floor Discussion.....	8:45 AM

IWC 10-08 9:00 AM

PHYSICO-CHEMICAL TREATMENT OF BIOLOGICALLY TREATED PHARMACEUTICAL WASTEWATER: EFFICIENCY OF FENTON'S REAGENT AND ACTIVATED CARBON

Anal Chavan, Ph.D., Vrajesh Mehta, and Priyanka Keshari, Siemens Information Systems Ltd., Bangalore, Karnataka, India

This study focuses on treatment of biologically treated pharmaceutical wastewater with Fenton's treatment and adsorption on powdered activated carbon (PAC). The optimum H₂O₂/COD ratio, H₂O₂/Fe ratio, and pH were found to be 3.0, 1.0 and 3.0, respectively, which resulted in COD and color removal efficiency of 66.5% and 99.0%,

Monday's Sessions

respectively. Fenton's treatment followed by adsorption on PAC resulted in 85.65% COD removal and 99.9% color removal at equilibrium.

Discusser: Frank Johns, P.E., Tetra Tech, Lakewood, CO	9:25 AM
Closure & Floor Discussion	9:35 AM
Break	9:50 AM

IWC 10-09

10:10 AM

GENERATING POWER FROM ONION WASTE

Juan Josse, UTS Bioenergy, LLC, Irvine, CA; Andrew Dale, and Lynn Orphan, HDR, Irvine, CA

The AERS eliminates 200,000 lbs/day of onion waste: extracts juice for anaerobic treatment, cleans biogas and powers two 300-kW fuel cells. Onion cake after juicing becomes cattle feed. The system has been operating since July 2009. The paper discusses plant configuration, performance and lessons learned after one year of operation.

Discusser: Peter Lemke, P.E., MWH Americas, Inc., Denver, CO	10:35 AM
Closure & Floor Discussion	10:45 AM
Conclusion	11:00 AM

TRACE METALS/SELENIUM REMOVAL

Date:	Monday, October 25
Time:	8:00-11:00 AM
Room:	San Antonio Ball Room

Trace Contaminants are of growing interest in these modern times. Analytical methods have advanced to allow measurement at unprecedented levels. Environmental and health data is accumulating on the impact of contaminants are lower and lower levels. New regulations are emerging requiring lower and lower levels of treatment. Treatment technology is being developed to meet all of these issues. This session will focus on Trace Contaminants issues with two papers on selenium and the different approaches to treatment. The third paper will focus on removal of phosphate and the heavy metals copper and chrome.

Session Chair:	H. Robert Goltz, Ph.D., Dow Special Separations, Midland, MI
Discussion Leader:	Fred Vance, Kemira, Atlanta, GA
IWC Representative:	Dan Rice, DBR Consulting, Sault Ste. Marie, MI

Session Introduction

8:00 AM

H. Robert Goltz, Ph.D., Dow Special Separations, Midland, MI

IWC 10-10

8:10 AM

EMERGING BIOLOGICAL SELENIUM REMOVAL PROCESSES FOR REFINERY WASTEWATER

Yakup Nurdogan, Ph.D., P.E., Bechtel National, Inc., Pueblo, CO; Patrick Evans, Ph.D., CDM, Bellevue, WA; John Christiansen, M.S., CDM, Houston, TX

This paper provides the potential selenium removal technologies and discusses their mechanisms, features, and benefits. The selenium removal methods are compared for their effectiveness in treating various selenium species: selenite, selenate, and selenocyanate. Selenium removal to 5 ppb level may be viewed a mission impossible with low-cost technologies.

Discusser: Joon H. Min, Ph.D., Psomas, Orange County, CA.....	8:35 AM
Closure & Floor Discussion	8:45 AM

Monday's Sessions

IWC 10-11

9:00 AM

BIOLOGICAL TREATMENT OF NITRATE AND SELENIUM: TWO PILOT CASE STUDIES OF ACTIVE AND PASSIVE WATER TREATMENT

Tom Rutkowski and Rachel Hanson, Golder Associates Inc., Lakewood, CO

Over the past several decades, selenium has emerged as a significant water quality issue that impacts multiple industries including mining, agriculture, petroleum, and power generation. In recent years, biological treatment of selenium has emerged as an effective and relatively inexpensive treatment method compared with physical and chemical methods. Biological selenium treatment relies on dissimilatory microbial reduction of dissolved selenium species (i.e., selenate, selenite) to insoluble elemental selenium. This paper presents results from two distinct coal mine drainage pilot tests: an active test using an Immobilized Cell Bioreactor (ICB) and a passive biochemical reactor (BCR) test.

Discusser: David D. Friese, Applied Process Technologies, San Francisco, CA 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:50 AM

IWC 10-12

10:10 AM

REMOVAL OF WATER POLLUTANTS BY IMMOBILIZED MAGNETITE NANO-PARTICLES

Adva Zach-Maor, Raphael Semiat, and Hilla Shemer, Technion, Haifa, Israel

Iron nano-particles loaded charcoal granular activated carbon (nFe-GAC) was developed for effective removal of inorganic water pollutants. Three different contaminants of concern were examined, phosphate and the heavy metals; chromium (VI) and copper. Adsorption experiments indicated very efficient contaminants adsorption, particularly compared with other adsorbents capacities. Kinetics characterization was conducted by analyzing the compatibility of the experimental data with four different models. Potential adsorbent regeneration was shown to enable the reuse of the immobilized magnetite nano-particles for several consecutive cycles.

Discusser: Yongheng Huang, PhD, PE, Impaired Water Treatment,

College Station, TX..... 10:35 AM

Closure & Floor Discussion 10:45 AM

Conclusion 11:00 AM

Monday's Sessions

KEYNOTE SESSION

Date:	Monday, October 25
Time:	11:15 AM-12:00 NOON
Room:	San Antonio Ball Room
Session Chair:	Wayne E. Bernahl, W. Bernahl Consultants

- CHAIRMAN'S WELCOME
- PRESENTATION OF ANNUAL AWARDS
- KEYNOTE ADDRESS: WATER FOR ENERGY-
WATER IMPLICATIONS FOR GLOBAL ENERGY
DEVELOPMENT

*Michael Hightower, Water for Energy Project Lead,
Sandia National Laboratories, Albuquerque, NM*

Water and energy are interdependent — water is used extensively in energy development as cooling water in thermoelectric power generation; in oil and alternative transportation fuels refining, and in biofuels production. At the same time, water and waste water pumping, treatment, and distribution is one of the largest energy use sectors in many developed countries. At a time when fresh water availability is becoming limited in many regions due to changing precipitation patterns, increased ecological and environmental demands for water, and issues over sustainable surface and groundwater withdrawal and use, water consumption demands by the energy sector could expand significantly across the globe in the next three decades. The emerging water needs for the energy sector and the emerging energy needs for the water sector could significantly change how these two critical natural resources are developed and utilized.

This presentation will provide an overview of global energy demand increases and emerging global water supply shortages, and discuss associated regional energy development issues and challenges that are emerging. The presentation will also discuss areas of major research and development needed to minimize the impact of future surface and ground water resource availability on energy development.

Mr. Hightower is a Distinguished Member of the Technical Staff in the Energy Security Center at Sandia National Laboratories in Albuquerque, New Mexico. He is a civil and environmental engineer and has over 30 years experience in research and development projects. His current efforts include research and evaluation of innovative environmental and energy technologies and security and protection of critical water and energy infrastructures. One of his current activities is as project leader for development of a Science and Technology Roadmap for DOE for Energy-Water research and development. With scientists from Los Alamos, NETL, EPRI, and Sandia he also helped write a Report to Congress on current and emerging energy and water interdependencies and challenges. Mike holds Bachelor's and Master's degrees in civil engineering from New Mexico State University. He serves on the Executive Committee of the New Mexico Pollution Prevention Technical Resource Center, the Board of Directors for Citizens for Responsible Energy, is past-Chair of the Waste management Education and Research Consortium Industrial Advisory



Michael Hightower

Monday's Sessions

NEW METHODS IN BOILER ASSET PROTECTION AND SYSTEM EFFICIENCY

Date: Monday, October 25
Time: 1:30-5:00 PM
Room: Executive Salon 1

Improving boiler system efficiency and protecting boiler system assets reduces operating costs in many areas of utility operations. This session offers papers covering subjects that help reduce total system operating costs by improving system efficiency and protecting system assets.

Session Chair: Edward (Ted) Beardwood, Ashland Chemical Drew Division, Ajax, ON, Canada

Discussion Leader: Merrill Willett, University of Michigan, Ann Arbor, MI

IWC Representative: Wayne Bernahl, W. Bernahl Enterprises Ltd., Elmhurst, IL

Session Introduction 1:30 PM

Edward (Ted) Beardwood, Ashland Chemical Drew Division, Ajax, ON, Canada

IWC 10-13 1:40 PM

RESEARCH EVALUATION OF POLYAMINE CHEMISTRY FOR BOILER TREATMENT: PHASE DISTRIBUTION AND STEAM CARRY-OVER

Rosa Crovetto, Anthony M. Rossi, and Eunice Murtagh, GE Power & Water, Water & Process Technologies, Trevose, PA

Boiler water treatment programs for both high and low-pressure systems based on "polyamine" chemistry have been applied commercially in boilers worldwide for more than a decade. This paper will present data and discuss the phase distribution of a "polyamine" boiler water treatment as a function of the pressure as measured in experimental research boilers.

Discusser: Roger Light, Dow Chemical Company, Freeport, TX..... 2:05 PM

Closure & Floor Discussion 2:15 PM

IWC 10-14 2:30 PM

EVALUATING THE CORRELATION OF LOW CONDUCTIVITY BOILER WATER PITTING AND GENERALIZED CORROSION ANALYSIS COMPARED TO COUPONS AND ON-LINE WATER CHEMISTRY

Vickie G. Olson, Honeywell Field Solutions, Sandy Springs, GA; Slawomir Kus, Ph.D., Honeywell Process Solutions, Warsaw, Poland; Mark Yunovich, Honeywell Corrosion Solutions, Houston, TX; Sheree Xiu Zhao, Georgia Institute of Technology, Atlanta, GA

In order to validate a new on-line corrosion analysis system, testing was run on high purity water in the boiler cycle at two fossil power plants. Three metals that represent the metallurgy of the specific boiler cycle were installed in the probe. At the first plant, located in the Midwestern United States, the analyzer was compared to coupons over a short period of time. Because of excellent water quality control, corrosion on coupons and the analyzer were extremely low as measured in millimeters per year. An additional test was run on condensate pump discharge at an older plant in Mississippi for 90 days to allow more time to test accuracy. General and pitting corrosion readings were correlated to synchronized on-line pH, conductivity, ORP and Dissolved Oxygen data to determine if real time results could demonstrate whether the corrosion had a water chemistry and/or mechanical cause.

Discusser: Jim Robinson, GE Water & Process Technologies, Trevose, PA 2:55 PM

Closure & Floor Discussion 3:05 PM

Break 3:20 PM

Monday's Sessions

IWC 10-15

3:40 PM

STUDY OF DEAERATOR EFFICIENCY IMPROVEMENT AT A MANUFACTURING PLANT USING AT TEMPERATURE ORP

Richard Peterson, Christina Fleming, Scott Dolezal, and Kurt Kraetsch, Nalco Company, Naperville, IL

Deaeration is critical to boiler operations, as it is used to remove dissolved oxygen and other gases from the feedwater. At elevated temperatures, even minute quantities of oxygen can cause severe corrosion in steam systems. Typical deaeration is accomplished by a two step process: mechanical deaeration, followed by chemical deaeration. This paper reviews studies at a manufacturing plant and paper mill that utilized At-Temperature oxidation reduction potential (ORP) to optimize deaeration. Testing optimizes deaerator venting, while ensuring the corrosion potential of the feedwater does not change. Data before and after the studies are presented, along with calculated fuel savings resulting from the changes.

Discusser: Doug Dewitt-Dick, Champion Technologies, Fresno, TX 4:05 PM
Closure & Floor Discussion 4:15 PM
Conclusion 4:30 PM

FGD WASTEWATER

Date: Monday, October 25

Time: 1:30-5:00 PM

Room: Executive Salon 2

Coal fired power plants are under severe environmental pressure. As a source of fuel, coal will continue to be a major contributor to power generation in the US and is forecasted to provide greater than 50% of electricity globally through 2030. Therefore this session is extremely important, since it covers what the industry can do to reduce the environmental impact; with a special focus on Selenium removal. Authors include representatives from various perspectives; a major consulting firm and suppliers of the technology.

Session Chair: William Willersdorf, Siemens Water Technologies, Bridgewater, NJ

Discussion Leader: Michael Soller, Bowen Engineering Corporation, Indianapolis, IN

IWC Representative: John T. Lucey, Jr., P.E., HDR Engineering, Inc., Pittsburgh, PA

Session Introduction

1:30 PM

William Willersdorf, Siemens Water Technologies, Bridgewater, NJ

IWC 10-16

1:40 PM

SELENIUM SPECIATION AND PARTITIONING IN WET FGD SYSTEMS

Gary Blythe and Mandi Richardson, URS Corporation, Austin, TX; Paul Chu and Charles Dene, EPRI, Palo Alto, CA; Dirk Wallschlager, Ph.D., Trent University, Peterborough, ON, Canada; Kevin Fisher and Katherine Searcy, Trimeric Corporation, Buda, TX

The paper discusses results of EPRI-sponsored bench-scale tests conducted to determine factors that control selenium speciation in wet FGD systems. Also discussed are measurements of dissolved selenium concentrations and speciation in full-scale wet FGD systems, and results of efforts to improve sample preservation methods for measuring selenium species in FGD waters.

Discusser: Corey A. Tyree, Ph.D., Southern Company Services,
Birmingham, AL 2:05 PM
Closure & Floor Discussion 2:15 PM

Monday's Sessions

IWC 10-17

2:30 PM

CASE STUDY: COST-MINIMIZATION APPROACH TO THE DESIGN, PROCUREMENT, INSTALLATION, AND COMMISSIONING OF A FGD WASTEWATER TREATMENT SYSTEM AT A POWER STATION

Tony Lau, Ph.D., Infilco Degremont, Inc., Richmond, VA; Michael McDonough, Dominion Virginia Power, Chester, VA

An innovative approach was utilized to design, procure, install and commission a FGD wastewater treatment system at a power station in Virginia. Dominion Resources Services, Inc. and Infilco Degremont, Inc. partnered to develop a cost-effective FGD wastewater treatment system using a phased approach, "Open Book" approach. This highly successful project was commissioned in 2009, costs were kept below the target value, and the facility met all the performance guarantees.

Discusser: Thomas Lawry, HDR Engineering, Inc., Pittsburgh, PA 2:55 PM

Closure & Floor Discussion 3:05 PM

Break 3:20 PM

IWC 10-18

3:40 PM

ABMET: SETTING THE STANDARD FOR SELENIUM REMOVAL

Jill Sonstegard, James Harwood, and Tim Pickett, GE Power & Water Technologies, Salt Lake, UT; William Kennedy, P.E., Orion Engineering, Charlotte, NC

Removal of dissolved selenium in its oxidized forms has proven to be a formidable challenge for conventional water treatment systems. A novel approach to natural remediation technology is the utilization of fixed-bed bioreactors, which exploit naturally occurring, non-pathogenic microbes in an optimized, self contained system. These systems have been designed to remove selenium in less than a 2 hour hydraulic retention time while sequestering the contaminants in a minimal sludge volume for later disposal.

Discusser: A. Paul Togna, Ph.D., Environmental Operating Solutions, Inc.

Bourne, MA 4:05 PM

Closure & Floor Discussion 4:15 PM

Conclusion 4:30 PM

Monday's Sessions

PRODUCED WATER 1

Date: Monday, October 25

Time: 1:30-5:00 PM

Room: Executive Salon 4

The papers presented in this session deal with oil field produced waters from both Alberta and California. The topics covered include pipeline corrosion control, a study evaluating the optimization of the washing step of an ion exchange unit, a discussion of zero liquid discharge issues and a ZLD process specifically designed for produced water, and a paper on the use of short bed ion exchange to soften produced water.

Session Chair: Michael Sheedy, Eco-Tec Inc., Pickering, ON, Canada

Discussion Leader: Peter Midgley, Christ Water Technology Americas, LLC, New Britain, CT

IWC Representative: James Sabzali, Northville, MI

Session Introduction

1:30 PM

Michael Sheedy, Eco-Tec Inc., Pickering, ON, Canada

IWC 10-19

1:40 PM

SUBSURFACE WASH AND BACKWASH EFFECTIVENESS IN SAC VESSELS AT CENOVUS' FOSTER CREEK SAGD FACILITIES

Tamer Antar, EIT and Caroline W. Mussbacher, P.Eng., Cenovus Energy, Bonnyville, AB, Canada

The Cenovus SAGD facility of Foster Creek, located in Alberta, recycles 100% of produced water for reuse in a Once Through Steam Generator. The produced water is deoiled then a warm lime softener is used for silica removal and SAC WAC ion exchange is used for hardness removal. The performance of the SAC WAC ion exchange vessels is critical to ensuring hardness does not reach the boilers. To optimize the performance of the ion exchange vessels an review of the subsurface wash and backwash steps of regeneration was completed. Samples of effluent from the Subsurface Wash (SSW) and Backwash (BW) steps of regeneration were collected and analyzed for Total Suspended Solids (TSS), Oil and Grease (O&G) and Total Acidified Hardness (TAH) for a Primary Strong Acid Cation Ion Exchanger on Produced Water Service. The purpose of the trial was to determine if the frequency of SSW and BW steps could be decreased to decrease the strain on the vessel internals. Based on the trial results the frequency cannot be decreased, poor inlet water quality necessitates both a SSW and BW are performed at every regeneration. Additional conclusions and recommendations are based upon the trial results.

Discusser: Claude Gauthier, The Purolite Company, Paris, ON, Canada 2:05 PM

Closure & Floor Discussion 2:15 PM

Monday's Sessions

IWC 10-20

2:30 PM

CORROSION CONTROL IN INTER-SITE PIPELINE CARRYING PRODUCED OR RECYCLED WATER IN OIL-SAND

Jasbir Gill, Ph.D., Nalco Company, Naperville, IL

Pipeline asset integrity and corrosion control is very important due to environmental regulations and replacement cost. This paper presents the results of several laboratory studies undertaken to understand the corrosion mechanism and its mitigation. Actual pond water or process water from the Canadian oil-sand sites was used in these studies. Due to multiple stakeholders, the chemical treatment must meet no-harm testing, stringent environmental and production needs of everyone.

Discusser: Melonie Myszczyzyn, Canadian Natural Resources Limited,

Bonnyville, AB, Canada 2:55 PM

Closure & Floor Discussion 3:05 PM

Break 3:20 PM

IWC 10-21

3:40 PM

PRODUCED WATER RECOVERY AT SENECA RESOURCES USING SHORT BED ION EXCHANGE

Lewis Krause and Michael Sheedy, Eco-Tec Inc., Pickering, ON, Canada; Keith Jones, Seneca Resources Corporation, Bakersfield, CA

As a result of water restrictions in the Bakersfield area Seneca Resources has installed a new produced water recovery system. The paper reviews this process, which consists of water knock out and clarification tanks, an IGF unit, a specialized nutshell filter, and a short bed ion exchange softener that is regenerated with salt. The water being treated has a TDS level of 4,000-7,000mg/L. The specified target hardness level in the treated stream is < 1ppm. In actual service the ion exchange softener is consistently producing water with a hardness level < 0.5ppm. A description of the basic features of the technology and a history of the project through the pilot testing, design, commissioning and operating stages will be presented. Some novel aspects to be covered in the paper include the following: the use of an air scoured dual-media nutshell filter, the application of short bed ion exchange technology to the treatment of produced water, and an in-situ resin cleaning process.

Discusser: TBD 4:05 PM

Closure & Floor Discussion 4:15 PM

IWC 10-70

4:30 PM

HORIZONTAL EVAPORATORS: AN OPTION TO VERTICAL EVAPORATORS IN SAGD

J. Michael Marlett, P.E., P.Eng, Aquatech International Corporation, Hartland, WI

Evaporators in the Oil Sands have typically been Vertical Tube Falling Film design. These require large foundations and their height limit their ability to be installed inside buildings. An option is a Horizontal evaporator that would have low headroom requirements and could be installed completely inside a building. The horizontal evaporator offers unique opportunities for operation, maintenance, cleaning, installation and layout.

Discusser: Sudhir D. Parab, P.Eng., ConocoPhillips Canada Limited,

Calgary, AB, Canada 4:55 PM

Closure & Floor Discussion 5:05 PM

Conclusion 5:20 PM

Monday's Sessions

COOLING WATER 1

Date: Monday, October 25
Time: 1:30-5:00 PM
Room: San Antonio Ball Room

This session will discuss the challenges of cooling water chemistries to the cooling system and the discharge. In continuing efforts both financially and environmentally we are often asked to limit chemical and water usages. The session will discuss the ramifications of phosphonate discharge and uptake by the environment, modeling and prediction methods for scale control, and next generation treatment technology.

Session Chair: Jason Styve, Ph.D., Crown Solutions, Vandalia, OH
Discussion Leader: Phil Hazen, Water Works Services, Houston, TX
IWC Representative: James Dromgoole, Fort Bend Services, Inc., Stafford, TX

Session Introduction 1:30 PM

Jason Styve, Ph.D., Crown Solutions, Vandalia, OH

IWC 10-23 1:40 PM

DEVELOPMENT OF NEXT GENERATION PHOSPHORUS-FREE COOLING WATER TREATMENT TECHNOLOGY

Ray Post, Richard Tribble, and John Richardson, ChemTreat, Inc, Glen Allen, VA

This paper will discuss the status of emerging phosphorus discharge regulations and will review progress on the development of a completely Phosphorus-Free product line for cooling water treatment. The paper will review the experimental approach used to develop the new product line and will present data from laboratory screening rigs and from pilot cooling tower testing. Laboratory data on the development of a Non-P corrosion and deposit control program for a Nuclear Power plant will be reviewed as well as field data and results from several field case histories.

Discusser: TBD 2:05 PM
Closure & Floor Discussion 2:15 PM

IWC 10-24 2:30 PM

CALCIUM CARBONATE SCALE PREDICTION METHODS FOR COOLING TOWER WATERS- WHAT IS THE MOST ACCURATE, WHERE AND WHY SOME FAIL, AND HOW TO UTILIZE TO PROVIDE OPTIMIZATION OF A SCALE CONTROL PROGRAM

Paul Puckorius, Puckorius & Associates, Inc., Arvada, CO

This paper lists and compares the most common calcium carbonate scale prediction methods for cooling waters. It identifies where and why some methods are inaccurate and misleading with examples and actual case histories, but also identify which indices are the most reliable. It illustrates how an accurate prediction method can optimize a calcium carbonate scale control program as well as providing a cost reduction of cooling water treatments.

Discusser: TBD 2:55 PM
Closure & Floor Discussion 3:05 PM
Conclusion 3:20 PM

Tuesday's Sessions

REFINERY WASTEWATER

Date: Tuesday, October 26
Time: 8:00-12:00 NOON
Room: Executive Salon 1

The refining industry is faced with ever increasing and demanding environmental regulations to protect the environment. Wastewater from the refining process contains hazardous hydrocarbons, phenol, amines, ammonia nitrogen, BTEX compounds, heavy metals, total dissolved solids and other hazardous compounds. This session presents cutting edge trends in refinery wastewater treatment and waste minimization such as advanced membrane treatment for partial reuse; membrane biofilm treatment options for meeting stringent BOD and ammonia effluent limits; and advanced sludge processing for high quality oil recovery and "thermal delisting."

Session Chair: Ramesh Kalluri, P.E., Kalluri Group, Inc., Houston, TX
Discussion Leader: Jerry L. Penland, Chester Engineers, Moon Township, PA
IWC Representative: Michael B. Ryder, P.E., Chester Engineers, Moon Township, PA

Session Introduction **8:00 AM**

Ramesh Kalluri, P.E., Kalluri Group, Inc., Houston, TX

IWC 10-25 **8:10 AM**

STATE OF OPTIONS IN PETROCHEMICALS WASTEWATER TREATMENT PROCESSES

Rafique Janjua P.E., Fluor, Sugar Land, TX

The choices and options available to treat wastewater from Refineries and Petrochemical plants have substantially increased primarily due to ever stringent and challenging effluent standards. The equipment manufacturers, to outdo the competition, have added more products with fancier names and unrealistic performances guarantees. All this adds to substandard designs which are very difficult to operate. This paper discuss the different technologies and associated problems which the design engineers needs to be aware of before finalizing the process and or signing off the documents issued for design and construction.

Discusser: Bill Moore, P.E., Aquatech, Canonsburg, PA..... 8:35 AM

Closure & Floor Discussion 8:45 AM

IWC 10-27 **9:00 AM**

RESOURCE RECOVERY FROM REFINERY WASTEWATER SLUDGES AND WASTE
CONVERSION FROM HAZARDOUS TO NON-HAZARDOUS-A CASE STUDY AT A MAJOR OIL
REFINERY IN LOUISIANA

Jared Meiser and Bob Cook, Veolia Water, Houston, TX

A Sludge Management Facility is operated within a Louisiana refinery that recovers oil and water from wastewater sludges produced in the API Separator and DAF unit. The facility recycles these streams to the refinery for reprocessing, and the residual solids further undergo a delisting process so they may be disposed of at a local non-hazardous landfill.

Discusser: TBD..... 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:50 AM

Tuesday's Sessions

IWC 10-28

10:10 AM

SUCCESSFUL PILOT TRIAL TO RECYCLE PETROCHEMICAL WASTEWATER USING EXTERNAL MEMBRANE BIOREACTOR IN COMBINATION WITH HIGH EFFICIENCY REVERSE OSMOSIS (HERO)

Arun Mittal and Apurva Mulye, Aquatech International Corporation, Canonsburg, PA

An existing petrochemical plant in Middle-East is desirous of recycling its process wastewater after appropriate treatment for reuse as partial make-up to their demineralization system. The current practice for their wastewater management is to remove free oil through a gravity separator unit followed by pumping it to an independently owned centralized wastewater treatment facility in the area treating wastewater from other industries as well. The plant wastewater is characterized by the presence of oil, ammoniacal nitrogen and high COD. The COD to BOD ratio at more than 3:1 indicated resistance to biodegradability. Aquatech proposed a pilot trial for this wastewater using their external membrane bioreactor "Aqua EMBR" (Aquatech's Enhanced Membrane Bioreactor) process followed by High Efficiency Reverse Osmosis (HEROTM) process to meet client's objective. The pilot trial was successful in removing more than 90% COD in the wastewater through Aqua EMBR. Subsequent processing through HERO™ resulted in achieving 90% recovery of RO permeate on consistent basis. The quality parameters of RO permeate were suitable for its use as feed water to the demineralizer unit. Based on the positive results of the pilot trials, the client is actively considering implementation of full scale wastewater treatment and recycle plant using this technology solution.

Discusser: David Marrs, P.E., Valero Energy Corporation, San Antonio, TX 10:35 AM

Closure & Floor Discussion 10:45 AM

Conclusion 11:00 AM

COOLING WATER 2

Date: Tuesday, October 26

Time: 8:00-12:00 NOON

Room: Executive Salon 2

This session will cover new developments and techniques for cooling tower water systems that are "green", new microbiological monitoring, as well as new cooling tower design considerations plus predicting and controlling barium and strontium potential deposits particularly with reuse waters. Many practical considerations.

Session Chair: Raymond Post, P.E., Chemtreat, Inc., Langhorne, PA

Discussion Leader: Rick Lancaster, Toyota Motor Engineering & Manufacturing NA, Erlanger, KY

IWC Representative: Paul Puckorius, Puckorius & Associates, Inc./Water Training Serv., Arvada, CO

Session Introduction

8:00 AM

Raymond Post, P.E., Chemtreat, Inc., Langhorne, PA

IWC 10-29

8:10 AM

BARIUM AND STRONTIUM SCALE CHEMISTRY AND PREDICTION IN COOLING WATER SYSTEMS

Robert Ferguson and Baron Ferguson, French Creek Software, Inc., Kimberton, PA

Barium and strontium mineral scales have traditionally not been a problem in cooling systems. When low degrees of supersaturation were present for scales such as barium sulfate, inhibitor treatments targeting other scales were at levels sufficient to control deposition. Water reuse, and the quest for higher cycles, has created an environment

Tuesday's Sessions

conducive to the formation of barium and strontium sulfate scales. This paper discusses the prediction of barium and strontium sulfate and carbonate scales. Inhibitors effective against them are also reviewed.

Discusser: Rickey E. Smith, Southern Company Services, Birmingham, AL 8:35 AM
Closure & Floor Discussion 8:45 AM

IWC 10-30

9:00 AM

STATE OF THE ART OF FRIENDLY "GREEN" SCALE CONTROL INHIBITORS

Hilla Shemer, Ph.D. and David Hasson, Rabin Desalination Laboratory, Grand Water Research Institute, Technion, Haifa, ISRAEL; Alexander Sher, Nestle PTC, Marysville, OH

This review summarizes efforts to develop cost effective "green" anti-scalants. Currently, the most promising green scale inhibitors are based on poly aspartic acid. However, field operation data on polyaspartates are very limited. Biodegradable anti-scalants meeting food safety requirements would find many applications in the food and beverages industries but require further development.

Discusser: Michael H. Dorsey, DuPont Engineering, Orange, TX 9:25 AM
Closure & Floor Discussion 9:35 AM
Break 9:50 AM

IWC 10-31

10:10 AM

IN SITU MONITORING OF BIOFILM GROWTH AND DISINFECTION USING A THERMAL ANALYSIS MEASUREMENT TECHNIQUE

Olivier Horner and Celine Bouteleux, Electricite de France R&D, CHATOU Cedex, France

Biofilms are heterogeneous bacterial formations, which can grow on the inner surface of loop water circuits. They provide several advantages to bacteria, in particular they offer better protection against toxic agents (i.e. disinfectant solutions). In some cases, biofilms can function as a reservoir of pathogenic organisms such as Legionella. In an industrial cooling circuit, the development of biofilm on the walls of circuits can have various harmful consequences, such as loss of thermic performance and present health and environmental risks. To control this bacterial development, a better understanding of the growth and behaviour of biofilm is necessary. With this objective in mind, we have used a thermal analysis measurement technique in order to measure in real time and in situ the biofilm thickness in an industrial cooling circuit pilot. Indeed, a number of non-invasive and non-destructive techniques have been put forward and investigated in order to obtain information about the dynamic properties of biofilms. The thermal analysis measurement technique was found to be reliable in our conditions and sufficiently sensitive to follow the behaviour of a biofilm in raw river water circuit, and to evaluate the efficiency of two biocide treatments (i.e. a monochloramination and a chlorine cleaning treatment) which were applied. However, the data show that there is no correlation between biofilm thickness measurements and microbiological counts (especially the pathogenic Legionella bacteria and Naegleria fowleri amoeba), either in recirculating cooling water (issued from raw water river) or in biofilm, as already shown in the literature in the case of potable water systems.

Discusser: Jon Vernon, Lyondell Chemical Company, Channelview, TX 10:35 AM
Closure & Floor Discussion 10:45 AM

Tuesday's Sessions

IWC 10-32

11:00 AM

COOLING TOWER DESIGNS FOR THE WATER-CONSTRAINED NUCLEAR WORLD

Christopher Kaplan, Natasha Jones, Keegan Kinney, and Ram Narula, Bechtel Power Corporation, Frederick, MD

Today's cooling towers at Nuclear plants must address water limitations and poor quality water. Tower configurations, designs, and components have been developed and are being improved as a result. This paper identifies innovative technologies in the nuclear world and discusses how water availability and quality affect tower design and cost.

Discusser: TBD..... 11:25 AM

Closure & Floor Discussion..... 11:35 AM

Conclusion 11:50 AM

NUCLEAR

Date: Tuesday, October 26

Time: 8:00-12:00 NOON

Room: Executive Salon 4

After almost 2 decades, nuclear industry is beginning to flourish again with new designs, new regulations and new safety measures. The fresh interest in the nuclear energy has come from the worldwide attention to more green energy. Therefore, in this session, we will be introducing new technologies applied to improve the old nuclear power plants. Furthermore, we will be discussing, what the future holds for old and new nuclear power generation in terms of water regulations!

Session Chair: Venus Kaur, Southern California Edison, Westminster, CA

Discussion Leader: Sandy Schexnaider, GE Water & Process Technologies, Dallas, TX

IWC Representative: Kumar Sinha, P.E., Bechtel Power, Frederick, MD

Session Introduction

8:00 AM

Venus Kaur, Southern California Edison, Westminster, CA

IWC 10-33

8:10 AM

MODELING STUDIES AND ELECTROCHEMICAL EXPERIMENTS ON AMINE SYSTEMS

James Bellows, Ph.D., Siemens Energy, Inc., Orlando, FL; Matthew Taylor, Pennsylvania State University, University Park, PA

Theoretical and experimental studies of amines and decomposition products, typical of nuclear steam systems, have been performed. Acetic acid was selected as the typical decomposition product for these studies. Concentrations of the amine and acetate in the steam turbine were modeled based on concentrations derived from a plant with concentrations considered to be commonly found in the industry. The evolution of the solution from the first moisture has been modeled for a turbine during shutdown under turbine closed and turbine open conditions. Electrochemical experiment interpretation is reviewed. Results of electrochemical experiments at concentrations considered similar to some nuclear steam turbines and at higher concentrations are presented.

Discusser: Rosa Crovetto, GE Power & Water, Trevose, PA..... 8:35 AM

Closure & Floor Discussion..... 8:45 AM

IWC 10-34

9:00 AM

EFFECTS OF POLYACRYLIC ACID ON ION EXCHANGE RESINS

Douglas C. Kellogg, Siemens Water Technologies Corp., Rockford, IL

The use of polyacrylic acid has been used as an anticlumping agent for virgin ion exchange resins for many years. Early experiences with polyacrylic acid (PAA) have shown to cause kinetic impairment on strongly basic anionic exchange resins. Recent applica-

Tuesday's Sessions

tions of PAA as a dispersant in Power Plants has prompted further investigation of PAA to ensure it does not adversely effect Ion Exchange resin in this application. In this study, we will be exposing mixed bed resin to with various molecular weight polyacrylic acid solutions in various doses and investigating any effects on kinetic performance.

Discusser: David C. Auerswald, Southern California Edison, Westminster, CA..... 9:25 AM
Closure & Floor Discussion 9:35 AM
Break 9:50 AM

IWC 10-35 10:10 AM

IMPLEMENTATION OF ZINC INJECTION AT THE SAN ONOFRE NUCLEAR GENERATING STATION

Jonathon Muniga, Southern California Edison, Westminster, CA

Zinc injection into the Reactor Coolant System at the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 began in 2009 to reduce primary system dose rates. The implementation of zinc injection was performed to support the replacement of the plant's original Alloy 600 Steam Generators with new Alloy 690 Steam Generators.

Discusser: TBD 10:35 AM
Closure & Floor Discussion 10:45 AM

IWC 10-36 11:00 AM

ULTRA LOW SULFATE RESINS FOR CONDENSATE POLISHING APPLICATIONS IN NUCLEAR POWER PLANT

Peter Yarnell, Ph.D., Graver Technologies, LLC, Glasgow, PA

Development of an ultra low sulfate strongly acid resin for use in condensate polishers in BWR's will be presented. High quality condensate grade candidate resins are post-treated to minimize sulfate extractables. The post-treated resins undergo extraction for sulfate and chloride; extractables are quantified using ion chromatography.

Discusser: Terry Heller, Purolite Company, Rochester Hills, MI 11:25 AM
Closure & Floor Discussion 11:35 AM
Conclusion 11:50 AM

ZERO LIQUID DISCHARGE

Date: Tuesday, October 26
Time: 8:00-12:00 NOON
Room: San Antonio Ball Room

Wastewater discharge for various industries is a major concern and risk which needs to be mitigated. The implementation of increasingly stringent discharge requirements from local, state and federal governments and the uncertainty of future regulations have driven industries to look at options to liquid discharges. This session covers some of the challenges experienced and technologies applied to achieve the goal of Zero Liquid Discharge.

Session Chair: Patrick Randall, Aquatech International, Canonsburg, PA
Discussion Leader: J. Michael Marlett, P.E., Aquatech International Corp., Canonsburg, PA
IWC Representative: Dennis McBride, Fluor Enterprises, Inc., Greenville, SC

Session Introduction 8:00 AM

Patrick Randall, Aquatech International, Canonsburg, PA

IWC 10-39 8:10 AM

LOW TEMPERATURE CRYSTALLIZATION PROCESS IS THE KEY TO ZLD WITHOUT CHEMICAL CONDITIONING

William Shaw, P.E., HPD / Veolia Water Solutions & Technologies, Pewaukee, WI

A vacuum crystallization process operated at low temperature has been developed based

Tuesday's Sessions

on crystallization techniques used in the salt, chemical, and fertilizer industries. It is being applied in wastewater treatment and recycle to achieve zero liquid discharge for some difficult waste streams.

Process wastewater from coal gasification, shale gas frac and produced water, limestone forced oxidation FGD scrubber blowdown, landfill leachate, and cooling tower blowdown where the make-up water is treated municipal effluent are all examples of waste streams containing highly soluble salts that are extremely difficult to evaporate to dryness.

Discusser: Matthias Loewenberg, Ph.D., GEA, Columbia, MD 8:35 AM
Closure & Floor Discussion 8:45 AM

IWC 10-37 **9:00 AM**

DESIGN AND CONSTRUCTION CONSIDERATIONS FOR ZERO LIQUID DISCHARGE FACILITIES

Jim Beninati, HDR Engineering, Inc. Pittsburgh, PA; Michael Soller, Bowen Engineering, Indianapolis, IN

HDR discusses challenges and solutions as the facility design engineer for a zero liquid discharge (ZLD) mine water treatment system. The subject project removes salinity from wastewater via reverse osmosis, further concentrates it via thermal evaporation, and then crystallizes it for removal from the aqueous phase. The resulting low TDS effluent is re-used in the mining process, and the removed salt is further processed as road salt.

Discusser: Brian Clarke, Kiewitt Power Engineers Co., Lenexa, KS 9:25 AM
Closure & Floor Discussion 9:35 AM
Break 9:50 AM

IWC 10-38 **10:10 AM**

ACHIEVING ZERO DISCHARGE AT EL PASO ELECTRIC COMPANY'S NEWMAN GENERATING STATION USING AN INNOVATIVE EC-UF-RO SYSTEM

Jose Carlos, Bustamante, El Paso Electric Company, El Paso, TX

An in-depth evaluation of zero liquid discharge treatment options by El Paso Electric Company resulted in the selection of an innovative combination of Electrocoagulation, Ultrafiltration, and Reverse Osmosis. The system addresses many of the pitfalls associated with existing ZLD systems while minimizing the manpower, chemical, and energy requirements.

Floor Discussion 10:30 AM

Tuesday's Sessions

MONITORING AND CONTROL OF WATER CHEMISTRY IN BOILER SYSTEMS AND OTHER APPLICATIONS

Date: Tuesday, October 26
Time: 1:30-5:00 PM
Room: Executive Salon 1

This session will discuss new and continuing aspects of controlling boiler system water chemistry with on-line instrumentation. Topics include use of corrosion product samplers and at temperature ORP to monitor system corrosion, integrated conductivity sensors, and the merits of degassed cation conductivity measurements. In addition, information on a new image based water analyzer that can be used for particle analysis in water treatment plants will be presented.

Session Chair: Deborah Bloom, Nalco Company, Naperville, IL
Discussion Leader: Jack Reinhart, Controls Link, Inc., Sewickley, PA
IWC Representative: Colleen M. Layman, P.E., Bechtel Power Corp., Frederick, MD

Session Introduction 1:30 PM

Deborah Bloom, Nalco Company, Naperville, IL

IWC 10-40 1:40 PM

CORROSION PRODUCTS SAMPLING

Jeff McKinney, Sentry Equipment Corp., Oconomowoc, WI

Recent studies and activities have re-emphasized the importance of understanding and minimizing iron and copper transport in a thermal power plant. In this session we will discuss practical uses of a device that can be used to determine the average metals concentration over a specific period of time.

Discusser: Wayne Bernahl, W. Bernahl Enterprises Ltd., Elmhurst, IL 2:05 PM
Closure & Floor Discussion 2:15 PM

IWC 10-41 2:30 PM

BENEFITS OF INTEGRATED CONDUCTIVITY SENSORS IN WATER TREATMENT SYSTEMS

David M. Gray and Stefan Raabe, Mettler-Toledo Thornton, Inc., Bedford, MA

Conductivity provides reliable monitoring of water quality through the various stages of water treatment. Reported here is a recent technology contribution that improves accuracy and increases rangeability of measurement by over an order of magnitude. Integrating the physical sensor with the measuring circuit in a compact package, the unified sensor overcomes significant measurement limitations.

Discusser: Colleen M. Layman, P.E., Bechtel Power Corp., Frederick, MD 2:25 PM
Closure & Floor Discussion 3:05 PM
Break 3:10 PM

IWC 10-42 3:40 PM

DEGASSED ACID CONDUCTIVITY USED FOR THE STEAM QUALITY MONITORING: CONCEPT, SPECIFICATIONS AND LIMITATIONS

Markus Bernasconi, SWAN Analytische Instrumente AG, Hinwil, Switzerland

Operators of cycling plants have to respect the steam purity guidelines issued by the turbine manufacturer. This can result in a considerable loss of power generation while waiting for the required steam conductivity. Degassed acid conductivity could help to differentiate between carbon dioxide and steam impurities. The paper will explain the technical concept of a reliable analyzer, its specifications and limitations.

Discusser: Nadan Vani, Bechtel OG & C, Houston, TX 4:05 PM
Closure & Floor Discussion 4:15 PM

Tuesday's Sessions

IWC 10-43

4:30 PM

NEW IMAGE-BASED WATER ANALYZER FOR REAL-TIME MONITORING AND RESEARCH

Kent Peterson and Harry Nelson, Fluid Imaging Technologies, Inc., Yarmouth, ME

Assessing the condition of a water system is significantly enhanced when provisions can be made for continuous, rapid, and real-time monitoring and analysis. This paper will describe a real-time, imaging particle analysis system and its applications in water treatment monitoring.

Discusser: William J. Hebert, Sr., Global Chem-Feed Solutions,

New Britan, PA 4:55 PM

Closure & Floor Discussion 5:05 PM

Conclusion 5:20 PM

PRETREATMENT

Date: Tuesday, October 26

Time: 1:30-5:00 PM

Room: Executive Salon 2

Pretreatment is a broad topic that can encompass a variety of treatment processes to pre-condition fluids for further treatment. Four different technologies will be discussed in the papers presented. This session will provide an opportunity to hear veterans of the industry discuss new developments as well as some of the unusual applications he has encountered over the course of his career. Additional technologies covered will include high efficiency pleated filters for a wide spectrum of particle sizes, advancements in high rate lime softener design, and the application of fractal water distribution in the chlor-alkali industry.

Session Chair: Robert Applegate, Graver Water Systems, Cranford, NJ

Discussion Leader: Paul Gross, Liquid Process Technologies, Inc., Houston, TX

IWC Representative: Michael Gottlieb, ResinTech, West Berlin, NJ

Session Introduction

1:30 PM

Robert Applegate, Graver Water Systems, Cranford, NJ

IWC 10-44

1:40 PM

NEW AND UNUSUAL ITEMS IN WATER TREATMENT

George Crits, Aqua-Zeolite Sciences, Inc., Ardmore, PA; William Runyan, IDRECO, West Chester, PA

New Items involve recent developments: "Pressure In Tank Degassing", Hot Water Sterilization of Small filter systems, Novel method of cleaning packed towers. And unusual Items for review are: Fog Collectors and Air To Water, Ammonia/NaOH regenerants combination, Brine Miser, Fish Warning System, Vinegar/Peroxide Sterilization, reclaiming spent regen. H₂SO₄ with CaSO₄, Ultra pure water pH/Conductivity.

Discusser: Steve Gagnon, AVANTech, Inc., Columbia, SC 2:05 PM

Closure & Floor Discussion 2:15 PM

IWC 10-45

2:30 PM

PILOT TESTING OF DRAFT TUBE-ENHANCED CRYSTALLIZATION AND SAND-BALLASTED SETTLING TECHNOLOGIES PROVES NEW HIGH-RATE SOFTENING APPLICATION FOR REFINERIES

Holly Johnson and Mark Hess, N.A. Water Systems, a Veolia Water Solutions & Technologies Company, Moon Township, PA

Advanced sand-ballasted, high-rate settling systems have been combined with softening

Tuesday's Sessions

chemistry to provide efficient water treatment solutions for the oil and gas industry. A pilot test conducted at CVR Energy in Coffeyville, Kansas, demonstrates the capability of this solution to rapidly soften water for use in refinery processes.

Discusser: Robert T. O'Connell, WRA, Inc, Port Monmouth, NJ	2:55 PM
Closure & Floor Discussion	3:05 PM
Break	3:10 PM

IWC 10-46 **3:40 PM**

USE OF FRACTAL LIQUID DISTRIBUTION FOR PRODUCING DEMINERALIZED WATER FOR CHLOR-ALKALI INDUSTRY

Richard Posa and Matthew Burger SAMCO Technologies, Inc., Buffalo, NY; Christopher Martin, ERCO Worldwide (USA), Inc., Port Edwards, WI

This paper deals with a case study of the design, selection and application of 2 bed counter current ion exchange utilizing Fractal distributor technology. The paper will discuss the design, installation and commissioning of the technology. Paper will include discussion on the technology and reason for selection. We will also compare design against actual field performance. Additionally, we will compare actual system performance against theoretical projected performance of conventional 2 bed and 2 bed / mixed bed deionization systems.

Discusser: Loraine Huchler, P.E., CMC, MarTech Systems, Inc., Lawrenceville, NJ	4:05 PM
Closure & Floor Discussion	4:15 PM

IWC 10-47 **4:30 PM**

WIDE PARTICLE SIZE SPECTRUM, HIGH EFFICIENCY PLEATED FILTERS

Fred Tepper, Leonid Kaledin, Ph.D., Olga Vargas, and Tatiana Kaledin, Argonide Corporation, Sanford, FL

The performance of an electropositive depth filter is benchmarked for filtration efficiency, flowrate and dirt holding capacity versus a number of other depth filters and ultraporous membranes. The 2 micron pore size filter exceeds all others in virtually all attributes, including its ability to retain particles as small as virus and nanometer size colloidal particles.

Discusser: Kaivan Foroughi, Graver Technologies, Glasgow, DE	4:55 PM
Closure & Floor Discussion	5:05 PM
Conclusion	5:20 PM

Tuesday's Sessions

RECYCLE/REUSE

Date: Tuesday, October 26
Time: 1:30-5:00 PM
Room: Executive Salon 4

Learn exactly where your water comes from when you order "Scotch & Water" on that long trip to Mars. Also, get the latest status on other less personal reuse projects involving cooling tower blowdown, integrated gasification combined cycle greywater, as well as one yet undetermined project and presentation.

Session Chair: Brian Heimbigner, Siemens Water Technologies, Warrendale, PA
Discussion Leader: Arun Mittal, Aquatech International Corporation, Canonsburg, PA
IWC Representative: James Dromgoole, Fort Bend Services, Inc., Stafford, TX

Session Introduction 1:30 PM

Brian Heimbigner, Siemens Water Technologies, Warrendale, PA

IWC 10-48 1:40 PM

GREY WATER TREATMENT SYSTEM FOR DUKE ENERGY'S EDWARDSPORT IGCC POWER PLANT

M. Adam Edwards, HPD, LLC, Plainfield, IL; Andrew Broerman, Duke Energy, Edwardsport, IN

Duke Energy is constructing a coal gasification plant in Edwardsport, Indiana. The plant will use advanced IGCC technology to convert Indiana coal to a synthetic gas that is used to produce power. The process wastewater from gasification operations must be treated to remove contaminants before it can be discharged to the environment. This paper describes the development and design challenges of the Grey Water Treatment System.

Discusser: Michele Funk, Bechtel Power Corporation, Frederick, MD 2:05 PM

Closure & Floor Discussion 2:15 PM

IWC 10-49 2:30 PM

RECYCLING URINE IN SPACE

Patricia Mendoza Watson, NASA, Washington, DC

Water conservation and water quality are critical aspects of living in space. The costs and logistics of resupplying water to the International Space Station drive the need to be as efficient with the water available. That means recycling urine to provide potable water. How this is achieved is the subject of this paper.

Discusser: J. Michael Marlett, P.E., P. Eng., Aquatech, Hartland, WI 2:55 PM

Closure & Floor Discussion 3:05 PM

Break 3:10 PM

IWC 10-50 3:40 PM

WATER REUSE FOR NEW AND EXISTING COOLING TOWER SYSTEMS- GUIDE LINES AND RECENT EXPERIENCES

Paul Puckorius, Puckorius & Associates, Inc., Arvada, CO

This paper provides both case histories and guidelines for converting existing as well as planned cooling tower water systems from fresh water to recycle waters. It identifies the common problems encountered and how they can be avoided. The guidelines also lists the steps needed prior to and during the conversion process to assure good cooling water contacted equipment protection plus the limits of various water constituents on that equipment.

Discusser: David Clayton Ph.D., PPM Services, Houston, TX 4:05 PM

Closure & Floor Discussion 4:15 PM

Conclusion 4:30 PM

Tuesday's Sessions

PRODUCED WATER 2

Date: Tuesday, October 26
Time: 1:30-5:00 PM
Room: San Antonio Ball Room

This session will focus on scaling issues in Once Through Steam Generators (OTSG) and Produced water treatment methods in SAGD facilities. The papers in this session covers wide spectrum of topics such as scale & deposit formation, metallurgical degradation in OTSG's, produced water treatment by membrane and evaporation processes.

Session Chair: Donald Downey, Puro-lite Company, Paris, ON
Discussion Leader: Peter Meyers, ResinTech, Inc., West Berlin, NJ
IWC Representative: Manoj Sharma, Aquatech International Corp., Canonsburg, PA

Session Introduction 1:30 PM

Donald Downey, Puro-lite Company, Paris, ON

IWC 10-51 1:40 PM

CHARACTERIZATION OF DEPOSITION AND METALLURGICAL DEGRADATION IN OTSG OVERHEATING FAILURES

Paul Desch, Ph.D., Nalco Company, Naperville, IL

Numerous tube failures occurred in the economizer of an OTSG. Multiple tube sections from different passes and rows in the economizer that included bulged and non-bulged tubes were submitted for analysis. The amount and type of internal surface deposition were determined for the sections. The amount of deposition on the tubes varied appreciably with location. However, the composition of the deposition was generally consistent, even when comparing the hot and cold sides. Detailed microscopic analysis of stratified deposit layers by element mapping techniques highlighted distinct periods of deposition events that were related to upset conditions in boiler feedwater quality. This paper compares the internal deposition with associated tube degradation from elevated temperature exposure. In addition to the amount and components of the internal surface deposit layers, the strong impact of deposit morphology on increased metal temperatures is discussed.

Discusser: TBD 2:05 PM
Closure & Floor Discussion 2:15 PM

IWC 10-52 2:30 PM

SCALE AND DEPOSIT FORMATION IN STEAM ASSISTED GRAVITY DRAINAGE (SAGD) FACILITIES

Hugh Goodman, Martin Godfrey, and Thomas Miller, Nalco Company, Naperville, IL

Produced water and brackish well water are the main boiler feedwater sources for the steam assisted gravity drainage oil recovery process. Water separated from the produced oil emulsion (produced water) is high in silica. Brackish well water is high in hardness ions. The combination of these waters is unstable and can produce a variety of mineral scales in pretreatment components such as evaporators. Once-through steam generators can also suffer mineral scale formation as well as coke deposition. Composition of deposits from evaporators and steam generators will be discussed as well as the processes of formation and inhibition of those deposits.

Discusser: Dave Malkmus, ResinTech, Inc., West Berlin, NJ 2:55 PM
Closure & Floor Discussion 3:05 PM
Break 3:10 PM.....

Tuesday's Sessions

IWC 10-53

3:40 PM

COMPARISON OF PRODUCED WATER EVAPORATOR SYSTEMS AT CONNACHER GREAT DIVIDE AND ALGAR

Carolina Gonzalez and James Nowak, GE Water & Process Technologies, Bellevue, WA

The produced water evaporator system at the Connacher Oil & Gas Ltd. ("Connacher") Great Divide project began operation in late 2007. In early 2008, after several months of stable operation at Great Divide, Connacher proceeded with the Algar expansion project and selected an alternate evaporator system configuration. The Algar evaporator system utilizes an optimized version of the high pH evaporation technology employed at Great Divide and the other produced water evaporator systems in the Oil Sands. While the Great Divide system operates in a parallel configuration, the Algar system operates in a series configuration with a second-stage split sump evaporator. These design aspects result in improved energy efficiency and distillate quality compared to a parallel evaporator configuration. Connacher also elected to install Contaminant Reduction Systems in both evaporators at Algar to maximize distillate quality. This paper will present and compare designs and operational data from the Great Divide and Algar produced water evaporator systems.

Discusser: TBD 4:05 PM

Closure & Floor Discussion 4:15 PM

IWC 10-54

4:30 PM

HIGH RECOVERY REVERSE OSMOSIS FOR TREATMENT OF PRODUCED WATER

Robert J. Kimball, P.E., BCEE, CDM, Helena, MT

This paper presents a proven method of treating gas field produced water using reverse osmosis that achieves water recoveries as high as 98% with minimal potential for membrane fouling. Bench and pilot scale tests are presented as well as case studies that demonstrate the cost benefit compared to conventional treatment methods.

Discusser: TBD 4:55 PM

Closure & Floor Discussion 5:05 PM

Conclusion 5:20 PM

Wednesday's Sessions

RO/MEMBRANE

Date: Wednesday, October 27
Time: 8:00-12:00 NOON
Room: Executive Salon 1

This session continues with the theme of water recovery and reuse, with a focus on membranes and their applications to water reuse strategies. Papers cover a variety of innovative strategies for increasing water reuse and minimizing water discharge.

Session Chair: Peter Meyers, ResinTech, Inc., West Berlin, NJ
Discussion Leader: Jane Kucera, Nalco Company, Naperville, IL
IWC Representative: George Abraham, P.E., Veolia Water Solutions & Technologies, Moon Township, PA

Session Introduction 8:00 AM

Peter Meyers, ResinTech, Inc., West Berlin, NJ

IWC 10-55 8:10 AM

ZERO DISCHARGE DESALINATION (ZDD) TECHNOLOGY-ION SUBSTITUTION
ELECTRODIALYSIS MAXIMIZES WATER RECOVERY FOR INLAND DESALINATION

Brad Biagini, N.A. Water Systems, Moon Township, PA; Bernie Mack, Veolia Water Solutions & Technologies, Waltham, MA; Thomas A. Davis and Malynda Cappelle, Center for Inland Desalination Systems, University of Texas at El Paso, TX

Zero Discharge Desalination (ZDD) technology is being developed as a method to increase the recovery rate currently achieved by conventional desalination systems for treatment of brackish groundwater. This emerging technology combines reverse osmosis with electrodialysis metathesis to remove divalent salts from water. The process prevents the salts from precipitating during the production of purified water and thus increases the water recovery rates.

Discusser: TBD 8:35 AM

Closure & Floor Discussion 8:45 AM

IWC 10-56 9:00 AM

ENHANCING RO PERMEATE RECOVERIES WITH CYCLIC ION EXCHANGE

Francis Boodoo, Purolite, Bala Cynwyd, PA

New patent-pending "Cyclic Ion Exchange™(CIX-RO) technology uses the "free" salt available in RO reject to regenerate the softener without having to add extra salt. Unique shallow shell resins, key to the technology, can be efficiently regenerated with RO reject brine concentrations as low as 0.5%.

Discusser: Carl Galletti, ResinTech, Inc., West Berlin, NJ 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:40 AM

IWC 10-57 10:10 AM

NOVEL MEMBRANE FOULING TEST PROCEDURE TO COMPARE FOULING-RESISTANT MEMBRANES

Gregg Poppe and Abhishek Roy, Dow Water & Process Solutions, Edina, MN

A new fouling test procedure was developed to rapidly compare the fouling resistance of membranes with varying permeability. The resulting curve allows flux loss to be compared fairly at any flux. Testing a variety of flat-sheet RO membranes predicted the relative performance of RO elements operating in real fouling water.

Discusser: TBD 10:35 AM

Closure & Floor Discussion 10:45 AM

Wednesday's Sessions

IWC 10-58

11:00 AM

RECYCLING INDUSTRIAL WASTEWATER WITH INNOVATIVE MEMBRANE TECHNOLOGIES

Henia Yacubowicz, Koch Membrane Systems, Wilmington, MA; Antonia von Gottberg, Cambridge, MA

Two innovative membrane technologies are now being used in multiple plants to recycle industrial wastewater; an ultrafiltration membrane module for a membrane bioreactor with a unique single header design, and the world's largest reverse osmosis element. The paper describes the technologies and highlights case studies of several plants.

Discusser: TBD 11:25 AM

Closure & Floor Discussion 11:35 AM

Conclusion 11:50 AM

POWER PLANT WATER SYSTEMS DESIGN

Date: Wednesday, October 27

Time: 8:00-12:00 NOON

Room: Executive Salon 2

New regulations and constantly changing technologies are impacting the design of new power plants, as well as upgrades to existing plants, particularly regarding their water and wastewater treatment systems. This gives rise to many and varied questions. "How will carbon capture impact our water needs?" "How can we be sure our wastewater is meeting metals requirements?" "What can we do to build safety into our water treatment plant?" "Should we consider neutralizing amines instead of ammonia for pH control?" This session will address these questions and their impact to the design of the water systems in power plants.

Session Chair: Diane Martini, Sargent & Lundy, LLC, Chicago, IL

Discussion Leader: Steven Gagnon, AVANTech, Inc., Columbia, SC

IWC Representative: Dennis McBride, Fluor Enterprises, Inc., Greenville, SC

Session Introduction

8:00 AM

Diane Martini, Sargent & Lundy, LLC, Chicago, IL

IWC 10-59

8:10 AM

AUTOMATED SELENIUM ANALYZER FOR WATER QUALITY MONITORING

Vladimir Dozortsev, Ph.D., William T. Dietze Ph.D., and Li Xiao Ph.D., TraceDetect Inc., Seattle, WA; Derek A. Eggert, Ph.D., Southern Research Institute, Birmingham, AL

As the result of implementing CAIR (Clean Air Interstate Rule) numerous Flue Gas Desulfurization (FGD) systems have already been installed throughout the power industry and many new ones are expected to be installed in the near future. Wastewater generated by FGD scrubbers is contaminated by captured toxic metals (Hg, Se, As etc.) and require treatment before discharge. Metal removal from FGD wastes is a complicated and costly task, especially when selenium contamination is targeted. Therefore automated metals monitors capable of operating in hard industrial environments is of high priority to ensure proper FGD waste management and meet future strict metal discharge limits.

Discusser: Steve Gagnon, AVANTech, Inc., Columbia, SC 8:35 AM

Closure & Floor Discussion 8:45 AM

Wednesday's Sessions

IWC 10-60

9:00 AM

INCORPORATING SAFETY INTO WATER TREATMENT DESIGN

Michele Funk, P.E., Michael Chuk, P.E., Kumar Sinha, P.E., Bechtel Power Corporation, Frederick, MD

Designing a water treatment system to incorporate safety is a complex mix of design and operating conditions and parameters; appropriate equipment and material specification and selection; control systems design for safe operational or failure conditions; and proper maintenance. The equipment must be designed not only to operate properly and efficiently, but also for operator safety including adding additional, sometimes "optional", safety equipment such as: flange guards, desiccant breathers on chemical tanks, and relief valves. Water treatment equipment frequently includes chemical treatment which requires safe handling, material selection for corrosion resistance, and storage. In addition to specifying proper equipment, the water treatment systems must have suitable control and interlocks to prevent unsafe operation including tank overflow alarms, valve interlocks, and emergency power shutoff. The water treatment areas must be designed for safe operation including location and quantity of safety showers, location and layout of chemical storage areas, and storage of compressed gasses. An integral part of water treatment plant design comes from operations and maintenance personnel themselves. Appropriate maintenance of water treatment equipment is vital for the safety of operations personnel in addition to efficient process or equipment operation. This paper will discuss some options on how to integrate safety into the design, selection, layout, or maintenance of equipment typically used in the water treatment industry.

Discusser: Jim Braun, AVANTech, inc., Columbia, SC..... 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:50 AM

IWC 10-61

10:10 AM

EXPERIENCES USING NEUTRALIZING AMINES TO CONTROL PH AND MINIMIZE FAC IN A COMBINED-CYCLE POWER PLANT

Robin Kluck, GE Water and Process Technologies, Trevose, PA; Juan Torres, GE Water & Process Technologies, Ponce, PR; Adolfo Antompietri and Jose Rivera, EcoElectrica L.P., Penuelas, PR

Proper pH control is necessary to protect power plant feedwater systems from damage caused by flow-assisted corrosion (FAC). Many plants use ammonia for pH control, but it is not always the best choice. This paper discusses experiences using neutralizing amines to control power plant feedwater pH and to mitigate FAC.

Discusser: Peter Lemke, P.E., MWH Americas, Inc., Denver, CO 10:35 AM

Closure & Floor Discussion 10:45 AM

IWC 10-62

11:00 AM

CARBON CAPTURE TECHNOLOGY RAMIFICATIONS ON POWER PLANT WATER TREATMENT

Sandra Kolvick, P.E. and Dennis McBride, Fluor Enterprises, Inc., Charlotte, NC

This paper analyzes the impact of a full-scale coal power plant Carbon Capture and Sequestration (CCS) system on the water treatment facility size and scope. Supporting a CCS system will require additional (1) plant gross megawatt output, (2) demand for process water, and (3) wet cooled heat exchanger duty.

Discusser: Wayne Micheletti, Wayne C. Micheletti, Charlottesville, VA 11:25 AM

Closure & Floor Discussion 11:35 AM

Conclusion 11:50 AM

Wednesday's Sessions

NATURAL GAS HYDRO FRACTURING FLOW BACK WATER TREATMENT

Date: Wednesday, October 27
Time: 8:00-12:00 NOON
Room: Executive Salon 4

The May 10, 2010 Wall Street Journal stated that "Shale Gas Will Rock the World". This session will address the issues that must be considered and alternative approaches that can be utilized to process the flow back and produced water that is generated by hydro fracturing shale formations to produce natural gas. The session will begin with a summary of the water treatment and regulatory issues that must be considered in processing flow back water. The session then includes presentations of different treatment approaches used and the various treatment mechanisms that are being utilized to allow recovery of this valuable natural resource.

Session Chair: Devesh Mittal, Aquatech International Corporation, Canonsburg, PA
Discussion Leader: Jeffrey S. Cadman, P.E., GAI Consultants, Inc., Homestead, PA
IWC Representative: John T. Lucey, Jr., P.E., HDR Engineering, Inc., Pittsburgh, PA

Session Introduction **8:00 AM**

Devesh Mittal, Aquatech International Corporation, Canonsburg, PA

IWC 10-63 **8:10 AM**

WATER MANAGEMENT: TREATMENT OF FRAC WATER AT WELLHEAD

Chuck Kozora, Aquatech, Canonsburg, PA

Water management is a critical component to the ability to continue drilling into the natural resources available in Marcellus Shale. Wastewater treatment and recycle/reuse issues not only impact the ability to continue drilling due to environmental and corporate social responsibility challenges but can also impact production achieved during the well development. The presentation will focus upon a water treatment rig, essentially a mobile evaporator, and how its use impacts production, economics, and environmental compliance. Presented topics will include basic specifications, field requirements and operation, and general benefit analysis.

Discusser: Bradley D. Wolf, P.E. Navigant Consulting, Pittsburgh, PA..... 8:35 AM

Closure & Floor Discussion 8:45 AM

IWC 10-64 **9:00 AM**

PRECIPITATION REACTIONS IN HYDROFRACTURING WASTEWATER TREATMENT

John Schubert, P.E., HDR Engineering, Inc., Sarasota, FL

The hydrofracturing of gas shale results in flowback and produced waters that contain substantial dissolved solids, including calcium, barium, strontium, magnesium and iron. This paper will reviews the amounts of these present, their potential impact in reuse and precipitation methods for controlling their concentration.

Discusser: Scott C. Quinlan, GAI Consultants, Inc., Pittsburgh, PA..... 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:50 AM

IWC 10-65 **10:10 AM**

NORM REMOVAL FROM FRAC WATER IN A TREATMENT FACILITY

James Silva and Hope Matis GE Global Research Center, Niskayuna, NY; Joseph Tinto, GE Water and Process Technologies, Bellevue WA

This report describes a proposed pretreatment process for NORM removal in a central thermal evaporation and crystallization facility to recover distilled water and salt from frac water. Brine is treated to remove iron, manganese, and suspended solids, followed

Wednesday's Sessions

by NORM removal in two unit operations. First, Ra is adsorbed onto resin, which is disposed in a NORM-licensed landfill. Then, Ba and remaining Ra are coprecipitated as sulfates, which are disposed in a RCRA-D nonhazardous landfill.

Discusser: Jerry Penland, Chester Engineers, Moon Township, PA 10:35 AM
Closure & Floor Discussion 10:45 AM

IWC 10-66 **11:00 AM**

WATER RECOVERY VIA THERMAL EVAPORATIVE PROCESSES FOR HIGH SALINE FRAC WATER FLOWBACK

Joseph Tinto and Robert Solomon, Ph.D., GE Water & Process Technologies-RCC Thermal, Bellevue, WA

A study of water recovery involving thermal processes of evaporation combined with salt production by crystallization was undertaken. Studies of the reuse of the distillate and beneficial use of salt products, meeting TCLP & ASTM standards were conducted. The results of the simulations and pilot testing are discussed.

Discusser: TBD 11:25 AM
Closure & Floor Discussion 11:35 AM
Conclusion 11:50 AM

NON-CHEMICAL COOLING WATER WITH PANEL DISCUSSION

Date: Wednesday, October 27

Time: 8:00-12:00 NOON

Room: San Antonio Ball Room

This session provides new developments and case histories of non-chemical cooling tower water treatments to control scales and microbiological problems. These papers highlight the conditions needed for successful performance of non-chemical programs as well as combinations of non-chemical with chemical treatments for a complete cooling water treatment program.

Session Chair: John J. Farmerie, Cyrus Rice Water Consultants, Inc., Pittsburgh, PA

Discussion Leader: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services, Arvada, CO

IWC Representative: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services, Arvada, CO

Session Introduction **8:00 AM**

John J. Farmerie, Cyrus Rice Water Consultants, Inc., Pittsburgh, PA

IWC 10-67 **8:10 AM**

A NEW MECHANICAL WATER SOFTENER USING PLASMA DISCHARGE WITH AN APPLICATION TO THE PREVENTION OF MINERAL FOULING IN COOLING WATER

Young Cho, Ph.D., Yong Yang, Hyongsup Kim, Andrei Starikovskiy, and Alex Fridman, Drexel University, Philadelphia, PA

A new plasma discharge system with a plasma-assisted self-cleaning filter reduced calcium ion concentration by 70% in cooling water, thus preventing mineral fouling in condensers. The plasma discharge system is an environmentally friendly solution for the problems caused by hard water. It is a true mechanical water softener, which is an energy-efficient green technology.

Discusser: TBD 8:35 AM
Closure & Floor Discussion 8:45 AM

Wednesday's Sessions

IWC 10-68

9:00 AM

HYDRODYNAMIC CAVITATION FOR COOLING WATER TREATMENT: A TECHNOLOGY UPDATE

Phil Vella, Ph.D., VRTX Technologies, Schertz, TX

The objective of this paper is to describe a non-chemical alternative technology for cooling water treatment based on the principle of hydrodynamic cavitation. This paper will be divided into three sections. 1. The basics of cavitation, including current computer modeling. 2. The effectiveness of this technology through analysis of site data taken over a period of 3-5 years. 3. Commonly asked questions from water treatment professionals about the technology.

Discusser: TBD 9:25 AM

Closure & Floor Discussion 9:35 AM

Break 9:40 AM

IWC 10-69

10:10 AM

FIELD COMPARISON OF A NOVEL ULTRASONIC MICROBIAL CONTROL PROGRAM WITH A CONVENTIONAL BROMINE MICROBIAL CONTROL PROGRAM

Donald Weakley, Ashland Hercules Water Technologies, Ajax, ON, Canada

The treatment of light industrial cooling water systems by high frequency, low power ultrasonic technology has proven to be an effective method to reduce, if not eliminate, the use of chemical biocides. A field study was conducted to compare the efficacy of ultrasonic technology versus conventional bromine oxidative technology as the microbiological control component of an overall cooling water treatment program. The study was conducted for a period of 12 weeks on a compressor-based cooling system that uses a plate and frame heat exchanger. Data analysis indicated significant benefits were gained through ultrasonic application. In addition to improved heat exchange, other benefits included the elimination of hazardous chemicals and a significant reduction in under-deposit corrosion potential. Control parameters and data collection protocol are described in detail.

Discusser: TBD 10:35 AM

Closure & Panel Discussion 10:45 AM

PANEL DISCUSSION

A panel discussion will be held after the sessions papers are presented for approximately one hour. This is to replace our usual formal discussions of the papers. It is an opportunity to ask and challenge the authors on their presentations as well as obtaining greater details on the performance of their systems. We encourage the session attendees to participate in this panel discussion to answer any questions on the non-chemical processes.

Conclusion 11:40 AM

Workshops

CONTINUING EDUCATION WORKSHOPS

This year's workshops will cover relevant topics such as Water and Wastewater Treatment for Natural Gas Frac Water, Reverse Osmosis, Ion-Exchange Technology and a special package of 3 basic water treatment courses. The workshop program is designed to provide practical information that includes a basic understanding of the topic as well as detailed case studies. They are presented by experts in the field and are loaded with technical content, not sales information. Each workshop will provide an opportunity for a technical exchange between the students, the instructor and other workshop participants. The workshops will provide attendees 4 professional development hours (PDHs) and a certificate of completion.

Wednesday, October 27

1:00-5:00 PM

W1: WATER TREATMENT 101*

Presented by: Kumar Sinha, Bechtel Corporation, Frederick, MD and Dennis McBride, Fluor Enterprises, Inc., Greenville, SC

This workshop is a great introductory course covering the basic concepts of water treatment for industry. It will address unit operations (clarification, filtration, lime/ soda ash softening, iron and manganese removal, membrane filters, and roughing demineralizers) used in water preparation for industry with emphasis on power, chemical industry, and refineries including treatment of makeup water for cooling water systems, and boiler water makeup. Wastewater generated by these unit operations and their treatment & disposal will be discussed. Basic water chemistry requirements for low, medium, and high pressure boilers will be considered with chemical conditioning as required.

Wednesday, October 27

1:00-5:00 PM

W2: TREATMENT OF PRODUCED WATER FROM ENHANCED OIL RECOVERY FOR USE IN ONCE THROUGH STEAM GENERATORS

Presented by: Robert Holloway, Holloway Associates, Etobicoke, ON, Canada

This four hour course will explore the theoretical and practical aspects of treating de-oiled produced and blended waters to produce high pressure steam in once through steam generators as used in SAGD enhanced oil recovery operations. Treatment processes considered will include hot and warm lime softening, after filtration and weak acid cation softening. Important equipment design and practical operating parameters will be discussed including in-situ vs. external regeneration of resins.

Wednesday, October 27

1:00-5:00 PM

W3: HRSG AND HIGH PRESSURE (> 900 PSIG/60 BAR) BOILER WATER TREATMENT AND OPERATION

Presented by: David G. Daniels, Mechanical & Materials Engineering, Austin, TX

This workshop will cover the water quality required for high pressure (> 900 psig) steam boilers, the various treatments being used and new developments relative to protection from scale and corrosion. The course also covers treatment issues related to the pre-boilers and the condensate systems. The course includes a discussion of controls and troubleshooting techniques. Operators, utility plant supervisors, managers, and engineers can all benefit greatly from the practical information provided in this course.

Workshops

Wednesday, October 27

1:00-5:00 PM

W4: INDUSTRIAL BOILER WATER TREATMENT (UP TO 1800 PSIG/120 BAR)

Presented by: James O. Robinson, GE Betz, Trevose, PA

The course is intended for those interested in industrial steam systems operating at pressures up to 1800 psig. While some basic theory is covered, the main focus of the course is to provide practical information that can be used to avoid common system problems. The course covers deaerators, boilers, steam turbines and condensate systems from both mechanical operation and chemical treatment aspects. The causes of deposition and corrosion as well as water quality and monitoring guidelines and chemical treatment options are discussed in an informal atmosphere.

Thursday, October 28

8:00 AM-12:00 Noon

W5: REVERSE OSMOSIS - BACK TO BASICS*

Presented by: Jane Kucera, Nalco Company, Naperville, IL

The application of reverse osmosis (RO) has grown rapidly over the last 15 year. However, some of the basics have been lost in shuffle. Furthermore, many times professionals and operators familiar with ion exchange are now faced with operating RO systems with little or no training. This Workshop covers the basics of RO, from sound design to proper operating techniques. Fouling and concentration polarization, data collection and normalization, cleaning and storage are just some of the topics included in this Workshop. This Workshop is intended for all who need to understand the basics of RO.

Thursday, October 28

8:00 AM-12:00 Noon

W6: WATER AND WASTEWATER TREATMENT FOR NATURAL GAS FRAC WATER

Presented by: John Schubert, HDR Engineering, Sarasota, FL

The Marcellus well field is one of several deep shale formations in the US holding substantial reserves of natural gas. It runs from central New York through Pennsylvania and West Virginia, and extends into Kentucky, Virginia and Ohio. Estimated reserves exceed 50 trillion cubic feet of natural gas. To extract the gas requires sophisticated drilling techniques. Hydrofracturing is required to form channels in the shale to allow the gas to flow to the well. This course provides detailed information on water use in the hydrofracturing process, from the water supply side as well as the treatment of flowback water from the frac'd well. The quality requirements for water supply will be reviewed from theoretical and practical perspectives. Data will be presented identifying the nature of water recovery from the hydrofractured well, both for quantity and quality. Treatment options, including thermal treatment options, will be reviewed, and where available design criteria will be noted. Progress will be described on installation / startup of full scale facilities to providing water supply and frac water treatment.

Thursday, October 28

8:00 AM-12:00 Noon

W7: BIOLOGICAL TREATMENT OF REFINERY AND CHEMICAL PLANT WASTEWATERS

Presented by: Dr. Enos L. Stover, Ph.D., P.E., DEE, The Stover Group, Stillwater, OK

This workshop provides a review of the basic design and operating considerations for aerobic and anaerobic treatment technologies that are applied to industrial wastewater treatment for the food, refinery, chemical, power and other industries. The workshop will address basic concepts for organic BOD and COD removal and will introduce concepts for biological nutrient removal. This workshop provides practical design and operational information on the various types (SBR, MBR, MMBR, activated sludge, etc.) of biological wastewater treatment technologies in use today for industrial wastewaters.

Workshops

Thursday, October 28

1:00-5:00 PM

W8: ION EXCHANGE TECHNOLOGY AND PRACTICAL OPERATING PRACTICES*

Presented by: Wayne Bernahl, W. Bernahl Enterprises, Ltd., Elmhurst, IL

This workshop provides detailed review of the various ion exchange processes for softening and demineralizing water as preparation for boilers, cooling, and process applications. A section on how to evaluate systems, their resin, operation, and water quality of ion exchange units is an excellent troubleshooting and informative portion of this workshop. A review of the different ion exchange resins available along with the newest developments and how those can be applied to provide specific water quality is a must for water treatment operations. A great opportunity to ask questions and solve problems.

Thursday, October 28

1:00-5:00 PM

W9: CURRENT NEW TECHNOLOGIES IN IDENTIFYING AND CONTROLLING BIOLOGICAL DEPOSITS AND CORROSION BY MIC FOR COOLING WATER SYSTEMS & REUSE WATER AS COOLING WATER MAKEUP

Presented by: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services, Arvada, CO

This workshop will combine presentations on recycle water for cooling towers as well as presentations on MIC (microbiologically influenced corrosion) detection as well as control. Since there are major concerns with recycle water and microbiological activity, these two subjects complement each other and identify the best approaches for recycle water use in cooling tower water systems.

Exhibitors

The IWC Exhibit Hall featured over 50 different opportunities to learn about practical and innovative solutions for the industrial water treatment industry from industry leaders.

A listing of all 2010 IWC Exhibitors is provided below, along with a detailed listing with contact information and company description to contact Exhibitors.

ADVANCED MICROLABS

Contact: Doug Johnson
Phone: 970-492-4383
Fax: 866-657-3691
E-mail: djohnson@advancedmicrolabs.com
Website: www.advancedmicrolabs.com

Advanced MicroLabs LLC is a chemical analytical instrumentation company dedicated to pioneering MicroChip Electro Chromatography measurement techniques. Since 2003, Advanced MicroLabs has operating as a research stage company; beginning in 2010, Advanced MicroLabs entered the commercialization stage for Ion Analysis in the Industrial Clean Water Market.

AQUATECH INTERNATIONAL CORPORATION

Contact: Patrick Randall
Phone: 724-746-5300
Fax: 724-746-5359
E-mail: randallp@aquatech.com
Website: www.aquatech.com

Established in 1981, Aquatech International Corporation is a global leader in water purification technology for industrial and infrastructure markets with a focus on desalination, water reuse, and zero liquid discharge. Aquatech's product groups include Raw Water Treatment, Ion Exchange, Membrane Processes (UF/RO/MBR), Thermal Desalination (MED/MSF), Wastewater/Effluent Treatment and Zero Liquid Discharge.

AUCHEL PRODUCTS LTD.

Contact: Prateek Tandon
Phone: 91-22-4063-2600
Fax: 91-22-4063-2627
E-mail: ptandon@auchtel.com
Website: www.auchtel.com

Auchtel Products Ltd. is a Manufacturer of world class Ion Exchange Resins which are used in various potable and non potable water treatment applications as well as wide variety of process applications. With over 30 years of experience in helping our customers find the right solutions, we have fine tuned our resins to meet the needs of tomorrow. We are Gold Seal Certified by the Water Quality Association.

AVANTECH, INC.

Contact: James Braun
Phone: 803-622-5426
Fax: 803-407-1215
E-mail: jbrown@avantechinc.com
Website: www.avantechinc.com

AVANTech, Inc. is a comprehensive industrial water treatment solutions provider. Our extensive experience in engineering process systems enables us to create integrated solutions that can dramatically improve operations in industrial, commercial, power, and nuclear power applications.

Exhibitors

BJ PROCESS AND PIPELINE SERVICES COMPANY

Contact: Stewart Emmerson
Phone: 832-519-2060
Fax: 832-519-2001
E-mail: stewart.emmerson@bjsservices.com
Website: www.bjsservices.com

Pre-commissioning and turnaround services. Chemical cleaning, boiler and pipe systems. Flowmac flushing of lube and hydraulic systems. Air and nitrogen drying. Accelerated cooldown processes with N2 and Co2. Laboratory and development facilities.

BOWEN ENGINEERING

Contact: Michael Soller
Phone: 317-842-2616
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E-mail: msoller@bowenengineering.com
Website: www.bowenengineering.com

Bowen is a self-performing, employee owned, general contractor focused on water, wastewater and power construction. Headquartered in Indiana, Bowen is working throughout the Central and Eastern United States. As a leading design-builder in the country, our ability to listen and collaborate with our Partners and Clients has made us their contractor of choice. Let's fix it together.

CEDA INTERNATIONAL CORPORATION

Contact: Todd Anderson
Phone: 403-253-3233
Fax: 403-252-6700
E-mail: tanderson@cedagroup.com
Website: www.cedagroup.com

CEDA International Corporation is a global leader driven by talented and passionate people who are committed 24/7 to delivering world class industrial maintenance, turnaround and construction services through innovative technologies, equipment and processes, safely every time. Since 1973, clients have relied on CEDA International Corporation to deliver outstanding technical services that optimize their investments, improve their competitive position and increase their long-term success.

CHEMICO INTERNATIONAL, INC.

Contact: Sam Owens
Phone: 281-599-3337
Fax: 281-599-3550
E-mail: sam@chemico.com
Website: www.chemico.com

CHEMICO specializes in high quality safe treatment products and services for cooling towers, boilers, and closed loop systems. We formulate and manufacture chemical concentrates or bases that are easily blended for end users and distributors. CHEMICO patented HiCycler, a water conservation process for cooling towers.

CHEMTRAC SYSTEMS, INC.

Contact: Robert Bryant
Phone: 770-449-6233
Fax: 770-447-0889
E-mail: chemtrac@chemtrac.com
Website: www.chemtrac.com

Chemtrac Systems, Inc. designs and manufactures instrumentation for coagulation/clarification/filtration/disinfection optimization, as well as for steam/condensate monitoring. Chemtrac is a global leader in providing streaming current monitoring technology for coagulant feed control, and offers online particle counters and particle monitors for continuous filter performance evaluation. The particle counters/monitors are also used in the steam generation cycle for corrosion product transport monitoring, condenser leak detection, and steam purity monitoring. Chemtrac also provides analyzers for chlorine, ozone, turbidity, and organics monitoring.

CHEMTREAT, INC.

Contact: Sydney Mosley
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E-mail: sydneym@chemtreat.com
Website: www.chemtreat.com

ChemTreat, Inc. is the nation's largest and fastest growing specialty chemical company dedicated solely to industrial water treatment. For the best products and world-class service, you've come to the right place. We have over 500 associates working throughout North and South America, the Caribbean, and some areas of Asia/Pacific regions. Our entrepreneurial spirit not only helps drive our company's success, but also carries over into our customers' facilities. We help our customers save millions of dollars every year, enabling us to achieve unparalleled growth in the water treatment industry.

COLUMBIAN TECTANK

Contact: Mark Eklund
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The EERC is a world leader in developing cleaner, more efficient energy and environmental technologies to protect and clean our air, water, and soil. The EERC is a high-tech, nonprofit division of the University of North Dakota, which pursues an entrepreneurial, market-driven approach to research and development to successfully demonstrate and commercialize technologies.

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