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2009
International
Water Conference®

October 4 -7, 2009

Hilton in
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Sponsored by:
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The 69th Annual International Water Conference®

CONFERENCE PROGRAM GUIDE

October 26-30, 2008
Crowne Plaza
Riverwalk Hotel
San Antonio, Texas U$A

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CHAIRMAN'S WELCOME ADDRESS


Kumar Sinha, P.E.

Welcome to the 69th Annual International Water Conference® (IWC). The Engineers' Society of Western Pennsylvania, the IWC Advisory Council, and the Executive Committee are very pleased to respond to the changes occurring in the water treatment industry nationally and internationally. Please review this year's program carefully, as it reflects our efforts to continue to offer diversity in selecting technical papers for the conference. We continue to offer timely sessions that will appeal to anyone who is active in the field of water and wastewater including Legionella Control, Water Reuse and Recycle, Refinery Wastewater Treatment, Zero Liquid Discharge, Biological Treatment, Flue Gas Desulphurization (FGD) Wastewater Treatment, Membrane and Resin Technologies, and Challenges facing the Nuclear Industry. We are offering many Continuing Educational Workshops (CEWs) for attendees to learn from experts in their fields and earn credit for their professional registration or merit. The Workshops are slated for both newcomers to the water industry and professionals who have been involved with engineering and science of water treatment applications.

This year's technical program has twenty one sessions and I am certain that you will find attending these sessions very rewarding. It will be difficult to narrow down the sessions that you will attend from the four technical sessions that are being presented concurrently. However, we will manage and adhere to our allocated time and schedule of our technical papers, allowing attendees to locate from one session to another as they maximize the benefits from participation in this year's conference.

Our exhibit hall is filled with exciting displays from our dedicated participants who are pioneers of the water treatment industry and from our own Advisory Council companies. We are very fortunate to be at this Crown Plaza Hotel facility. As you will see the Hotel is ideally laid out for a conference like ours. We have the exhibit hall located close to the technical sessions. We are also able to locate more exhibitors this year, which will enhance the experience of the attendees. The hotel is adjacent to the Riverwalk allowing for a multitude of evening options including excellent restaurants and entertainment venues. In addition, there are spousal programs, coffee klatches, and brunches to allow the visitors and guests to enjoy their time in a leisurely fashion.

This year's Keynote Speaker is Jean-Michel Herrewyn, Executive Vice president and CEO of Veolia Water Solutions and Technologies. He will address the Plenary Session on the Future of Water Treatment Industry: the Vision of a Commercial partner and how we should be prepared for handling tomorrow's changes. He will also discuss how the traditional difference between wastewater treatment and water treatment are already disappearing and the need for the industry to develop innovative technologies in reuse and recycling, desalination, biogas generation, minimization of energy consumption, metals recovery and bio-plastics production.

I want to recognize the dedication and hard work of the members of the Executive Committee and Advisory Council in continuing to step up to the plate and volunteering their time to make this conference a success. I want to especially

GENERAL INFORMATION

recognize this year's Technical Program Committee under Wayne Bernahl, Marketing Committee under Mike Gottlieb, Jim Sabzali, and Manoj Sharma, and the New Member Outreach Committee under Joe Loftis. I also wish to recognize Brad Wolf who chairs the Budget Committee for coming up with innovative ideas in managing the IWC funding requests. All our Executive Committee members have done a superb job in bringing this conference together with the help and valued assistance from the Advisory Council Companies. I also thank the authors, co-authors, session chairs, discussion leaders, and the discussers for moving the IWC forward and keeping the high quality of the papers for which we are well known. Please seek them out and extend your appreciation for all of their efforts.
Rest assured, the work is not finished, and we want to make even more improvements next year. We would like to encourage everyone to become part of the IWC planning and implementation process. I am pleased to welcome Dennis McBride as our newest member to the IWC Executive Committee. Also, many new companies have joined the Advisory Council this past year. Please feel free to approach any member of the IWC staff or Executive Committee to voice your interest, and we can review the options for your involvement.

Before closing, I wish like to acknowledge the hard work put in by David Teorsky, General Manager of ESWP and IWC Conference Manger, Tracy Devlin, who have been instrumental in planning and executing this conference. I thank the IWC Executive Committee and the ESWP Board to provide me with the opportunity to serve as the General Chair for 2008.
I hope to see you all at the 2008 IWC in San Antonio!

Kumar
Kumar Sinha, P.E.
2008 IWC General Chair
Principal Engineer, Bechtel Power Corporation

ABOUT THE IWC

The IWC is the world's premier conference for understanding and dealing with the technical and business challenges of industrial water treatment. IWC presents the latest in scientific advances and practical applications in this field, cutting across a wide range of industries and functional areas.

As the preeminent international technical forum in the field, the IWC will bring together more than 600 end users, researchers, practicing engineers, managers, educators, suppliers and contractors. It is dedicated to advancing new developments in the treatment, use and reuse of water for industrial and engineering purposes.

The IWC has always been a strong educational conference. Attendees come to learn about the latest applications available in the industrial water treatment industry, educate themselves in current technology and applications through attendance in IWC workshops, and network with their peers active in water treatment.

WHAT MAKES THE IWC DIFFERENT?

All papers presented at the IWC are carefully peer reviewed for quality and to ensure no commercial aspect is evident. In addition to the broad educational and networking opportunities being offered, the IWC invites you to participate through our unique Prepared Discussion program. Each Paper presentation at the Conference is followed by a Prepared Discussion—a thoroughly considered, different perspective on the topic. This is followed by an open floor discussion when all audience members and presenters can fully interact—ask questions, seek clarification, and raise alternative viewpoints. In essence—learn more!
If you are interested in becoming more involved with the International Water Conference®, simply contact the IWC office for more information.

ATTENDEE RECEPTIONS

To help you enjoy your stay in San Antonio, Texas during the 2008 IWC, we have many special events and activities planned for you. Join your fellow conference attendees at the annual Get Acquainted Reception, held on Sunday in the Exhibit Hall to welcome you to the Conference. Also, all registered attendees are welcomed to attend the Welcome Reception on Monday evening in the Exhibit Hall. 2 luncheon buffets are also provided in the Exhibit Hall on Monday and Tuesday. Schedule time to visit the exhibit and enjoy lunch on us!

If your spouse is accompanying you to the IWC please properly register him or her at the Registration Desk to gain admittance into these events

SPOUSES WELCOME RECEPTION

For spouses who are traveling with conference registrants, the IWC will host a Welcome Reception on Monday, October 27 at the Crowne Plaza Riverwalk Hotel. We will have a representative from the San Antonio Convention & Visitors Bureau present to discuss the many sites of San Antonio, as well as special discounted event pricing of many of the best sites to see. You will also be able to meet and network with other spouses to plan your own agenda of activities. Please complete registration form on the IWC home page.

PREPARED DISCUSSIONS

Each Technical Paper presentation is followed by a Prepared Discussion, giving you a thoroughly considered, different perspective. Also, all presentations are

GENERAL INFORMATION

followed by an open floor discussion where audience members and presenters can fully interact. The results: you can make better, more informed decisions.

PROFESSIONAL DEVELOPMENT HOURS

The Engineers' Society of Western Pennsylvania, sponsor of the IWC, is recognized as an Approved Provider by the Florida Board of Professional Engineers Bureau of Licensing. As such, attendees are eligible to earn up to 20 Professional Development Hours (PDH) to satisfy Continuing Education requirements. Official confirmation of your attendance will be provided upon request.

CONFERENCE PROCEEDINGS

All registered attendees (exc. Exhibit only) receive a CD containing the Official Conference Proceedings of the 69th Annual International Water Conference®. The CD will be direct mailed to you approximately 2 months following the conference.

AMERICANS WITH DISABILITIES ACT

The International Water Conference® and the Engineers' Society of Western Pennsylvania support the Americans with Disabilities Act (ADA), which prohibits discrimination against, and promotes public accessibility for, those with disabilities. We ask those requiring specific equipment or services as an attendee to contact the ESWP Conference Department and advise us of any such requirements in advance.

REGISTRATION DESK

The Registration Desk is your resource for all matters related to the IWC. The Registration Desk is located on the 2nd level of the Crowne Plaza Hotel, in the "PreConvene" area, outside of the Texas Ballroom. The Registration Desk will be open on Sunday from 5:00--8:00 pm, Monday from 7:00 am--7:00 pm, Tuesday from 7:00 am--5:00 pm and Wednesday from7:00 am--2:00 pm.

PRE-PRINT LOCATION

Pre-prints for most technical presentations are available at the Pre-Print Area located beside registration. Pre-prints can be purchased for $3.00 per copy. Also, you can find copies of previous years' IWC Proceedings (for $55 per volume). The Pre-Print Area will be open on Sunday from 5:00pm--7:00pm, Monday from 8:00am--6:00pm, Tuesday from 8:00am--5:00pm, and Wednesday 8:00am to 12:00noon.

MESSAGE BOARD

As a service to conference registrants, a message board will be located at the Registration Desk. The board will be maintained by the conference staff from 8:00 am Monday through noon on Wednesday. Messages will be retained until the end of each day.

NAME BADGE IDENTIFICATION

All registered conference attendees are asked to please wear your official IWC name badge at all times. Your official IWC name badge is your passport to Technical Sessions, the Exhibit Hall, and International Water Conference® social functions. In addition, important local phone numbers have been printed on the back of your badge for your use. To avoid any confusion with access to the events, please refrain from personalizing your official IWC name badge with any stickers, ribbons, etc., not provided by the Registration Desk.

REGISTRATION LISTS

Registrations received prior to October 17, 2008 have been compiled in THE IWC REGISTRATION LIST. This popular service provides attendees with additional networking opportunities.

An Addendum will be made available on-line containing those attendees that registered after October 17, 2008 and on-site during the conference. Please visit the IWC web site following the conference.

An electronic version of the full Registration List will be available at the Registration Desk the morning of Wednesday, October 29. It provides the names of all registered attendees in both Excel and comma-delimited text formats. There is a $25 fee.

IWC FUN RUN

Come join us for the 23rd annual IWC Fun Run in San Antonio! This event, sponsored by ResinTech, is open to all runners and walkers attending the conference and T-shirts will be awarded to all participants.

Start Time & Place: Tuesday morning, Oct. 28 at 7am sharp; meet in the Crowne Plaza Riverwalk Hotel lobby at 6:45am. Distance: 3 miles – flat and easy course.

INFO-SHARE SUITES

AQUATECH INTERNATIONAL CORPORATION

Suite: Executive Salon 3 — Suite Hours: Monday All Day
Contact: Amy Bloom — Phone: 724-746-5300
Fax: 724-746-5359 — E-Mail: aic@aquatech.com
Website: www.aquatech.com

EPICOR INCORPORATED

Suite: Presidential Suite — Suite Hours: Monday & Tuesday; 5 to 7 PM
Contact: Rose Bussiculo — Phone: 908-925-0800
Fax: 908-929-7795 — E-Mail: epicorinc@aol.com
Website: www.epicorinc.com

GRAVER WATER SYSTEMS, LLC

Suite: Directors II — Suite Hours: Mon/Tues; 10am-Noon & 2:00-6:30 PM, Wed; 9:00-11:00 AM
Contact: Robert Applegate — Phone: 908-653-4202
Fax: 908-653-4300 — Email: rapplegate@graver.com
Website: www.graver.com

LANXESS SYBRON CHEMICALS

Suite: San Antonio Ballroom — Suite Hours: Monday 7:30 PM - Midnight
Contact: Dwight Tamaki — Phone: 609-893-1100
Fax: 609-894-8641 — Email: dtamaki@sybronchemicals.com
Website: www.ionexchange.com

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Thanks to all of those who help to produce and present the 69th Annual International Water Conference®. A special thanks to the sponsors of this year's activities:

- LANXESS Sybron Chemicals- Welcome Banner
- Aquatech International - Conference Tote Bag
- GE Water & Process Technologies - Hotel Key Cards
- Resintech, Inc. - Fun Run

GENERAL INFORMATION

IWC EXECUTIVE COMMITTEE

The International Water Conference® (IWC) is sponsored by the Engineers' Society of Western Pennsylvania (ESWP), a membership based, not-for-profit organization, based in Pittsburgh, PA. Learn more at www.eswp.com. The IWC is planned mainly through the volunteer efforts of these top industry professionals who make up the IWC Executive Committee and IWC Advisory Council Company representatives. The ESWP extends a sincere thank you to the entire Executive Committee for their efforts in planning this years conference.

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IWC ADVISORY COUNCIL

The IWC Advisory Council is comprised of a group of companies that provide ongoing support for the planning of a successful conference. Membership is open to companies that have an interest in industrial water treatment and are willing to make a commitment to participate in several planning meetings thru the year to plan the IWC.

For more information about the IWC, see any member of the IWC Executive Committee or contact the IWC offices.

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Ronald Stier

CONDENSATE POLISHING

DATE: Monday, October 27
TIME: 8:00-11:00 AM
ROOM: Executive Salon 1

Condensate polishing has been a critical operation for operation of high pressure boilers for power generation for a long time. This session will cover the history of advances in condensate polishing and the related improvements in the ion exchange resins and system design. It also looks towards the future with an innovative approach using EDI for high pressure condensate polishing.

Session Chair: James Summerfield, Dow Water Solutions (*Midland, MI, USA*)
Discussion Leader: Donald Downey, The Purolite Company (*Paris, ON, Canada*)
IWC Representative: Dan Rice, Consultant (*Sault Ste. Marie, MI, USA*)

PAPER: IWC 08-01 **8:00 AM**

APPLICATION OF EDI TO CONDENSATE POLISHING IN THE POWER PLANTS

Sang-Hak Lee, Ji-Woong Jeong and Chang-So Lee, HaJI Co.,Ltd. (*An-San, South Korea*)

Hankook Jungsoo Industries Co., Ltd. developed a novel EDI module, which can be operated stably under severe operating condition without water leakages. In order to demonstrate stability and applicability of novel EDI module, we designed new CPP system consisted of microfiltration(MF) unit and EDI unit. The hollow fiber MF modules ahead of EDI unit were installed for removing insoluble impurities from the condensate water. A pilot plant of new CPP system, which has a water treatment capacity of 100 m3/hr, was installed at the CPP inlet line of commercial thermal power plant in South Korea and having been in continuous operation since October 2007. In this paper, the exclusive design of novel EDI module will be introduced. Also, the test results of pilot plant will be discussed.

Discusser: Peter Meyers, ResinTech (*West Berlin, NJ, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-02 **8:50 AM**

CONDENSATE POLISHING IN THE 21ST CENTURY FOR NUCLEAR AND SUPER CRITICAL POWER PLANTS

Robert Applegate, Graver Water Systems, LLC (*Cranford, NJ, USA*); Al Tavares, Graver Technologies, LLC (*Glasgow, DE, USA*)

This paper provides a brief history and timeline of condensate polishing from the 1950's to the present. It then discusses the equipment designs, process strategies, and plant operating techniques that are being employed and developed to address the increasingly stringent requirements of power plants in the 21st Century.

Discusser: George Crits, IDRECO USA (*Ardmore, PA, USA*) ..... 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-03 **10:00 AM**

CONDENSATE POLISHING SYSTEM UPGRADE WITH MELT-BLOWN, REVERSE GRADIENT, BACKWASH FILTER SEPTA

Kal Farooq, Pall Corporation (*Port Washington, NY, USA*)

Premature plugging of resin pre-coated, back-washable condensate filter septa cartridges with resin fines and contaminants, resulting in short runs, especially during start-ups when the contamination loading is the highest, is a common and wasteful occurrence at power plants. Besides short runs, filter by-pass, end-cap failures and system trips due to high filter differential pressure are all too common with condensate water backwash systems using typical, nominal rated commodity filtration. Engineered, high efficiency, reverse gradient depth media filter elements, manufactured by a proprietary melt-blown fiber technology, were installed at a combined cycle 775 MW electric generating plant located in the Northeast USA. The plant has a 275 MW steam turbine generator, using an air-cooled condenser for condensing the steam. This paper discusses the experience with the upgraded filtration over a period of 18 months.

Discusser: Gil Royal, Graver Technologies (*Glasgow, DE, USA*) ..... 10:20 AM

Closure & Floor Discussion ..... 10:30 AM

CURRENT CHALLENGES FACING NUCLEAR POWER PLANTS

DATE: Monday, October 27
TIME: 8:00-11:00 AM
ROOM: San Antonio Ballroom

This session includes papers covering a number of current challenges facing both operating and new generation nuclear plants. The topics covered include evolution of water technology at a nuclear plant, control of corrosion and deposition in once-through cooling systems and control of discharge of nutrients at new plants undergoing the licensing process in combination with the same issues faced by the existing units.

Session Chair: Julius Isaac, Bechtel Power Corporation (*Frederick, MD, USA*)

Discussion Leader: Tony Banks, Dominion Resources, Inc. (*Richmond, VA, USA*)

IWC Representative: Dennis McBride, Fluor Enterprises, Inc. (*Greenville, SC, USA*); Andrew Calderwood, Consultant (*Pittsburgh, PA, USA*)

REPORT: IWC 08-04 **8:00 AM**

THE EVOLUTION OF WATER PROCESSING TECHNOLOGY AT DIABLO CANYON NUCLEAR POWER PLANT

Sandy Schexnailder, GE Water & Process Technologies (*Dallas, TX, USA*)

Pacific Gas & Electric's (PGE) Diablo Canyon Power Plant (DCPP) has a unique 28-year evolution in filtration, evaporation, desalination and demineralization technologies that has been used in processing three distinctly different water sources for plant operation. The plant utilizes a combination of seawater, surface and well sources to provide water for steam generation, primary water, fire protection and potable use. This review of Diablo Canyon's evolution will serve as a brief history of water treatment technologies used over the course of time in the nuclear industry.

Closure & Floor Discussion ..... 8:20 AM

PAPER: IWC 08-05 **8:30 AM**

CONTROLLING CORROSION AND DEPOSITION IN ONCE-THROUGH NUCLEAR SERVICE WATER SYSTEMS

Peter Ten Eyck, Nalco Co. (*Wexford, PA, USA*); George Peabody, Nalco Co. (*Naperville IL, USA*)

Once-through nuclear service water systems are subject to numerous water-related degradation mechanisms that can lead to component failures and compromise cooling capacity. This paper provides several case studies of successful water treatment applications to control corrosion and deposits within this unique type of cooling water system.

Discusser: Anthony Selby, Mechanical & Materials Engineering (*Evergreen, CO, USA*) ..... 8:55 AM

Closure & Floor Discussion ..... 9:05 AM

Coffee Break ..... 9:20 AM

REPORT: IWC 08-06 **9:40 AM**

WATER MANAGEMENT PRACTICES IN NUCLEAR PLANTS - CONTROLLING AND MONITORING PHOSPHORUS IN DISCHARGE STREAMS

Cuong Truong and Gomes Ganapathi, Bechtel Power Corporation (*Knoxville, TN, USA*); Julius Isaac, Bechtel Power Corporation (*Frederick, MD, USA*); Tony Banks, Dominion Virginia Power (*Glen Allen, VA, USA*)

This paper describes the approach to the design of potential new plants and alternative treatments for existing plants. Phosphorus control in new nuclear plant discharges can be limited by selecting non-phosphate based corrosion and scale inhibitors in conjunction with proper material selection.

Closure & Floor Discussion ..... 10:00 AM

MONITORING – THE KEY TO SUCCESSFUL WATER TREATMENT OPERATIONS

DATE: Monday, October 27
TIME: 8:00-11:00 AM
ROOM: Executive Salon 4

Monitoring whether done in the lab or the field is the key to a successful water treatment application. Fast results, automation, precision and accuracy are all requirements in a modern monitoring program. This session discusses several new approaches to monitoring and controlling both in laboratory and field applications.

Session Chair: Phil Kiser, Hach Company (*Loveland, CO, USA*)
Discussion Leader: Charles Ascolese, GE Water & Process Technologies (*Trevose, PA, USA*)
IWC Representative: James Dromgoole, Fort Bend Services, Inc. (*Stafford, TX, USA*)

PAPER: IWC 08-07 — 8:00 AM

A FIELD TEST FOR RAPID DETECTION OF LEGIONELLA PNEUMOPHILA SEROGROUP 1 IN WATER SAMPLES

Andrew Cooper and Tom Lindley, Nalco Company (*Naperville, IL, USA*); Neil Polwart and Ross Grant, hydrosense Limited (*Linlithgow, UK*); Howard Barnes and Eric Holmes, Nalco Company (*Northwich, UK*)

A rapid and easy to use on-site test for detecting L. pneumophila serogroup 1 bacteria in water samples was recently developed. The test provides results at a specific analytical sensitivity in 25 minutes. The test specifications and utility as part of a water system monitoring and control program are presented.

Discusser: Scott M. Boyette, Ph.D., GE Water Process Technologies, (*Trevose, PA, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-08 — 8:50 AM

NOVEL ELECTRODEIONIZATION DEVICES: APPLICATIONS IN INORGANIC ANALYSIS

John M. Riviello, Trovion Co. (*Santa Cruz, CA, USA*); Dr. Archava Siriraks, Trovion Pte, Ltd. (*Singapore*)

Electrodeionization (EDI) devices have been developed for integration into analytical instruments such as ion chromatographs. These EDI devices provide ultrapure water at the point of use, in real time and with a flow rate compatible with the instrument. Detection limits in the low part-per-trillion range can be achieved with these systems.

Discusser: Vadim Malkov, Hach Company (*Loveland, CO, USA*) ..... 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

MONDAY, OCT. 27

PAPER: IWC 08-09 — 9:50 AM

UPDATE ON THE STEAM ELECTRIC POWER EFFLUENT GUIDELINES

Diane Martini, Sargent & Lundy (*Chicago, IL, USA*)

A review of the "Interim Detailed Study Report for the Steam Electric Power Generating Point Source Category" published by USEPA in November 2006, and the Regulatory Agenda. Key findings and potential regulatory impacts will be presented, focusing on coal-fired units, FGD systems, mercury, boron, selenium and nitrogen compounds.

Discusser: Troy Pace, ChemTreat, Inc. (*Glen Allen, VA, USA*) ..... 10:15 AM
Closure & Floor Discussion ..... 10:25 AM

PAPER: IWC 08-10 — 10:40 AM

DIAGNOSTICS AND CONTROL OF SCALE AND CORROSION STRESS IN A 500 HP STEAM GENERATING SYSTEM USING NEW FLUORESCENCE AND OXIDATION-REDUCTION TECHNOLOGY

Marty Godfrey, Richard Peterson and Stephen Mori, Nalco Company (*Naperville, IL, USA*)

A new boiler control system was used at a chemical plant. An inert fluorescent tracer and solid-state fluorometer monitored and controlled antiscalant feed. A novel at-temperature oxidation-reduction potential sensor measured corrosion stress. Problems regarding deaerator performance and boiler carryover were diagnosed. Automation of chemical feed reduced dosage and variability

Discusser: Vickie Olson, Honeywell Field Solutions (*Atlanta, GA, USA*) . 11:05 AM
Closure & Floor Discussion ..... 11:15 AM

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

DATE: Monday, October 27
TIME: 8:00-11:00 AM
ROOM: Executive Salon 2

This session will present the importance of controlling hydroxide alkalinity in boiler water and turbine-drive steam in industrial boiler facilities from various points of view. The presentations will be followed by an open floor discussion period giving attendees the opportunity to offer comments or to seek answers to real life problems.

Session Chair: Robert Holloway, Holloway Associates (*Etobicoke, ON, Canada*)
Discussion Leader: Deborah Bloom, Nalco Company (*Naperville, IL, USA*)
IWC Representative: David Simon, Cyrus Rice Water Consultants (*Pittsburgh, PA, USA*)

REPORT: IWC 08-11 **8:00 AM**

PHOSPHATE IS PRACTICALLY CAUSTIC?

James C. Bellows Ph.D., Siemens Power Generation (*Orlando, FL, USA*)

This report explores the chemistry of phosphate, at 25°C and at boiler temperatures showing that hydrolysis of the phosphate ion is nearly complete and the hydrolysis of hydrogen phosphate ion is also very substantial. The chemistry of phosphate in a steam generator is practically that of sodium hydroxide and mono- or disodium-phosphate.

REPORT: IWC 08-12 **8:20 AM**

SILICA AND STEAM PURITY; IS IT A pH OR HYDROXYL ALKALINITY ISSUE

Edward S. (Ted) Beardwood, Ashland Water Technologies (*Ajax, ON, Canada*)

The paper will explore the effects of boiler water chemistry on silica volatility and pro-vide methods of prediction. How the suggested boiler water silica limits in the ASME Consensus on Operating Practices for the Control of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers were derived will be discussed and the elements comprising total steam purity will be disclosed.

REPORT: IWC 08-13 **8:40 AM**

AN INTRODUCTION TO ALKALINITY LIMITS FOR BOILER WATER TREATMENT

Robert D. Bartholomew, Sheppard T. Powell Associates, LLC (*Baltimore, MD, USA*)

This paper reviews the concerns, science, and experience relating to hydroxide alkalinity limits and presents an example of developing these limits. The goal is to develop An Alkalinity Supplement/Addendum to the Consensus on Operating Practices for the Control of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers.

Closure & Floor Discussion ..... 9:20 AM

Coffee Break ..... 9:00 AM

REPORT: IWC 08-14 **9:20 AM**

SODIUM HYDROXIDE IN STEAM TURBINES

Sudhir Rajagopalan and James C. Bellows, Ph.D., Siemens Power Generation, Inc. (*Orlando, FL, USA*)

Properties of NaOH solutions at steam turbine thermodynamic conditions are described. The concentrations possible in the liquid phase and distribution between liquid and vapor phases are examined and effects on the turbine are detailed as are effects on deposition of other materials. Effects of concentrated solutions on stress corrosion cracking of turbine steels are placed in perspective.

Panel Discussion ..... 9:40 AM

KEYNOTE SESSION

DATE: Monday, October 27
TIME: 11:15-12:15 PM
ROOM: San Antonio Ballroom
SESSION CHAIR: Kumar, Sinha, P.E., IWC Conference Chair

WELCOME AND CEREMONIAL RINGING OF THE BELL

AWARD OF MERIT AWARD

Each year, the International Water Conference® presents the Annual Merit Award to honor outstanding individuals in the field of industrial water technology. This year's Merit Awardee is Robert Holloway.

PAUL COHEN AWARD

As a memorial to Paul Cohen and his contributions to the power generation industry, the IWC is proud to recognize the authors of the most precise and innovative presentation in the field of power systems water technology that was presented at the 68th IWC. The paper IWC 07-13 Controlling Chemistry during Startup and Commissioning of Once-Through Supercritical Boilers: An Overview from the EPC Contractor's Perspective, was authored by Kathi Kirschenheiter; Michael Chuk; Colleen Layman; Kumar Sinha, Bechtel Power Corporation, (*Frederick, MD, USA*). Accepting the award is Colleen Layman, P.E. (Co-author)

JOSEPH A. LEVENDUSKY MEMORIAL SCHOLARSHIP

Epicor, Incorporated, in cooperation with the International Water Conference®, will present the 2008 Joseph A. Levendusky Scholarships to Chelsea Francis, Arizona State University, Nicole Felgenhauer of California State Polytechnic University and Louise S. Fox of California State University.

N.A. WATER SYSTEMS SCHOLARSHIP

Congratulations to the 2008 scholarship winner, Daniel Joseph Porter DeBroeck, of Texas A&M University.

KEYNOTE PRESENTATION

Jean-Michel Herrewyn, Executive Vice President, CEO, Veolia Water Solutions & Technologies (*Maurice, Ile de France, France*)

The water treatment industry today is on the verge of major changes dictated by environmental challenges and soaring energy prices. Water scarcity, increasingly stringent effluent discharge regulations and energy issues associated with water treatment, are becoming key factors in shaping the future of our industry.

To address tomorrow's challenges, our business needs to drastically change its approach to water treatment and develop innovative technologies in reuse and recycling, desalination, biogas generation, energy consumption minimization, metals recovery and bio-plastics production.

The traditional distinction between wastewater treatment and water treatment is already disappearing. Wastewater treatment will become a source of added value through reuse, by-products generation and energy recovery, while new advances in technologies will enable pure water and process water production to accurately adjust to all water uses.

The water treatment industry will tap into multidisciplinary fields, such as energy, biology or chemistry, to find its most efficient solutions. Its capacity to integrate and to combine leading-edge competencies from outside the conventional water treatment areas is expected to largely contribute to a new level of effectiveness.

In this context, the differentiating factor for the players in the water treatment industry will be the ability to internally master the far higher complexity of tomorrow's processes and locally provide customers with expertise and support tailored to their specific requirements.

Veolia Water Solutions & Technologies (VWS) is the global leader in water treatment. It has achieved this position through the technological expertise of its organization. The scale of technologies brought together in VWS, coupled with its commitment across the water cycle, ensure that CEO Jean-Michel Herrewyn has a relevant overview of the water treatment industry.

BIOGRAPHY:

Born in 1961, a graduate from the École Polytechnique and the École Nationale d'Administration, Jean-Michel Herrewyn started his career in 1986 as an engineer in the Avionics division of Thomson CSF. In 1991 he joined the Compagnie Générale de Chauffe (now Dalkia) as technical manager then general manager of the home automation subsidiary. In 1993 he became attaché to the managing director and in 1996 ran Dalkia's German subsidiary and later subsidiaries in Austria and Switzerland. At the beginning of 2000 he was also appointed general manager of Veolia Transport's German subsidiary, and also supervised developments in Austria and Switzerland. In 2000 he was appointed chairman of Valorec, a joint subsidiary of Dalkia and Veolia Environmental Services, created from the outsourcing of energy and waste management by Novartis plants in Basle (Switzerland). In March 2003 he joined Veolia Water as Managing Director of Veolia Water Solutions & Technologies.

MONDAY, OCT. 27

ACHIEVING SUSTAINABILITY THROUGH WATER RECYCLE/REUSE

DATE: Monday, October 27
TIME: 2:00-5:00 PM
ROOM: San Antonio Ballroom

Water conservation techniques have been expanded to a wide variety of innovative processes to recover, recycle, and reuse water in industries that provide energy. Cutting-edge treatment technologies and best management practices will be described through case studies. The reuse of sewage treatment plant effluent water, flue gas condensate, and acid mine drainage for make-up to various systems will be addressed, as well as the resultant effect on plant operations.

Session Chair: Paul Togna, Ph.D., Shaw Environmental (*Lawrenceville, NJ, USA*)
Discussion Leader: Colleen M. Layman, P.E., Bechtel Power Corporation (*Frederick, MD, USA*)
IWC Representative: George Abrahim, Veolia Water Solutions & Technologies (*Moon Township, PA, USA*)

PAPER: IWC 08-16 **2:00 PM**

DESIGN CHALLENGES IN IMPLEMENTING WATER MANAGEMENT CONTROLS: A NEW LOOK AT WATER RECYCLE AND REUSE IN POWER PLANTS

Lisa Bennett and Kumar Sinha, P.E., Bechtel Power Corporation (*Frederick, MD, USA*)

This technical paper will address conventional and advanced pretreatment and wastewater treatment technologies that should be implemented in new power plants to minimize wastewater generation, increase recycle and reuse of wastewater, and minimize discharge. The use of sewage treatment plant effluent water for power plant makeup will be discussed. The use of wastewater pre-concentration technologies to limit or eliminate liquid discharge will be presented along with several case studies.

Discusser: Diane R. Martini, Sargent & Lundy, LLC (*Chicago, IL, USA*) ..... 2:25 PM
Closure & Floor Discussion ..... 2:35 PM

REPORT: IWC 08-17 **2:50 PM**

FLUE GAS CONDENSATE AND ENERGY RECOVERY

Milan Teppler, Radscan Intervex (*Västerås, Sweden*); Jonathan Wood, Patrick Buzzell and Bill Willersdorf, Siemens Water Technologies (*Lowell, MA, USA*)

Power plants are increasingly turning to biosolids as an alternative fuel but their high moisture content results in flue gas with 30-50% water. This report describes a process to treat and recover flue gas condensate for reuse as boiler makeup water, using scrubbers, condensers, ultrafiltration, reverse osmosis, membrane degasification and electrodeionization.

Closure & Floor Discussion ..... 3:10 PM
Coffee Break ..... 3:20 pm

PAPER: IWC 08-18 **3:40 PM**

RECLAIMED WATER USE AS COOLING TOWER MAKEUP - THE ONGOING CHALLENGE

Timothy Eggert, GE Water & Process Technologies (*Seal Beach, CA, USA*); Gary Geiger, GE Water & Process Technologies (*Trevose, PA, USA*); Dan Harbs, GE Water & Process Technologies (*Fountain Valley, CA, USA*)

This paper reviews the history of reclaimed water use in the Southern California and at a local refinery as cooling system makeup. Some specific challenges are provided for illustration. The future of reclaimed water use in the Southern California and the world is discussed.

Discusser: Kashi Banerjee, N.A. Water Systems (*Moon Township, PA, USA*)4:05 PM

Closure & Floor Discussion .....4:15 PM

LEGIONELLA - REGULATION, RISK MANAGEMENT AND REDUCTION

DATE: Monday, October 27
TIME: 2:00-5:00 PM
ROOM: Executive Salon 1

For more than thirty years, the detection, monitoring and control of legionella bacteria in a variety of industrial and commercial water systems have been the focus of evolving legislation and technologies. The papers in this session provide valuable insight and perspective on advances and developments in the regulation, risk management and reduction of these ubiquitous freshwater bacteria.

Session Chair: Michael Trulear, Ph.D., ChemTreat, Inc. (*Glen Allen, VA, USA*)

Discussion Leader: Jay Farmerie, Cyrus Rice Water Consultants, Inc. (*Pittsburgh, PA, USA*)

IWC Representative: Wayne Micheletti, Wayne C. Micheletti, Inc. (*Charlottesville, VA, USA*)

REPORT: IWC 08-19 **2:00 PM**

PRACTICAL OPERATION OF THE VICTORIAN LEGIONELLA LEGISLATION OVER 6 YEARS-FROM AN AUDITOR'S PERSPECTIVE

Peter Roberts, Consultant (*Wheelers Hill, Victoria, Australia*)

The unique Legionella Legislation of the state of Victoria, Australia, involving Cooling Tower System Registration, Risk Management Plans and auditing of conformance, has been in full operation since 2002-3. This paper covers its practical operation, from the perspective of an authorised Legionella Auditor.

Closure & Floor Discussion .....2:20 PM

MONDAY, OCT. 27

REPORT: IWC 08-20 **2:30 PM**

LESSONS LEARNED FROM THE IMPLEMENTATION OF BIOCIDE STRATEGIES IN COOLING TOWERS

Dave Christophersen, Crown Solutions- Veolia Water S&T (*Vandalia, OH, USA*); Karim Essemiani, Veolia Water S&T North America (*Moon Township, PA, USA*); Alain Vidal and Sandrine Oberti, Veolia Water R&D (*Maisons Laffitte, France*); Jean Pierre Briffaut, Veolia Environnement R&D (*Paris, France*)

This paper presents the latest findings from a cooling tower pilot study and the results of recent studies performed at several cooling tower sites operated by Veolia Environnement. The studies consider state-of-the-art analytical methods to detect Legionella and to monitor high-risk cooling tower installations. A statistical analysis of key parameters for the audited cooling towers will be presented.

Closure & Floor Discussion .....2:50 PM

PAPER: IWC 08-21 **3:00 PM**

COOLING TOWERS, DRIFT, AND LEGIONELLOSIS

Thomas Bugler and John Lane, Evapco, Inc. (*Taneytown, MD, USA*); Dr. Richard D. Miller, Microbiology & Immunology, School of Medicine, University of Louisville (*Louisville, KY, USA*); Barry Fields, Ph.D., Centers for Disease Control and Prevention (*Atlanta, GA, USA*)

This paper will describe details of cooling tower air emissions including: drift quantity, droplet distribution, and plume dispersal. From this information, ranges of bacterial concentration at distances from the tower can be estimated for a certain concentration of legionellae in the tower water.

This paper will also describe the ecology of the bacteria in cooling towers and the epidemiology of outbreaks attributed to cooling towers. Most importantly, the paper will discuss the correlation of the bacteria-exposure model described in this paper with the incidents of disease from previously studied outbreaks.

Discusser: Jay Farmerie, Cyrus Rice Water Consultants (*Pittsburgh, PA, USA*).....3:25 PM

Closure & Floor Discussion .....3:35 PM

Coffee Break .....3:45 PM

PRETREATMENT

DATE: Monday, October 27
TIME: 2:00-5:00 PM
ROOM: Executive Salon 4

Water pretreatment requirements, methods, and technologies for a variety of processes are being presented. Such methods range from chemistry control and filtration to the use of reverse osmosis.

Session Chair: Michael Sheedy, Eco-Tec Inc. (*Pickering, Ontario, Canada*)
Discussion Leader: Greg Osen, Christ Water Technology Americas, LLC (*New Britain, CT, USA*)
IWC Representative: Joseph Loftis, Consultant (*Pittsburgh, PA, USA*)

REPORT: IWC 08-22 — 2:00 PM

SINGLE-STAGE VACUUM DEAERATION TECHNOLOGY FOR ACHIEVING LOW DISSOLVED GAS IN PROCESS WATER

Glenn Harbold and Jonathan Park, GasTran Systems (*Cleveland, OH, USA*)

A novel mechanical approach to single-stage vacuum deaeration has been developed in order to remove dissolved gases to extremely low levels in process water.

The technology uses process intensification principles to improve mass transfer processes involving gases and liquids. By imparting high shear and centrifugal forces on a liquid to create extremely small droplets, a large surface area is exposed through which efficient gas absorption and gas deaeration can occur. Once the small droplets are created, a vacuum pump is used to remove dissolved gases to low levels not achievable with other vacuum deaeration designs.

Applications for the technology include dissolved gas removal from liquids for beverage bottling, ion exchange, ultrapure applications, downhole water injection, boiler feedwater, and many other process water pre-treatment applications.

Closure & Floor Discussion ..... 2:20 PM

REPORT: IWC 08-23 — 2:30 PM

EMERGING WATER QUALITY ISSUES IN COMBUSTION TURBINE EVAPORATIVE COOLERS

Daniel J. Robinette, P.E., CH2M HILL (*Englewood, CO, USA*); Charlie Nichols, P.E., CH2M HILL (*Atlanta, GA, USA*)

Gas turbine manufacturers have developed stringent water quality guidelines for evaporative coolers. This paper will explore why these water quality guidelines exist, how they could be improved, and why they are difficult to meet in this day of water scarcity and reclaimed water use.

Closure & Floor Discussion ..... 2:50 PM

PAPER: IWC 08-24 — 3:00 PM

ELECTROPOSITIVE FILTRATION TECHNOLOGY IN AUTOMOBILE MANUFACTURING APPLICATIONS

Henry Frank, Argonide Corporation (*Sanford, FL, USA*); Rick Lancaster, Toyota Manufacturing, North America

NanoCeram electropositive filters exhibit a significant advantage in removing submicron particulate when used as RO membrane prefilters. This reduces cleaning cycle frequency, extend the lifetime for a membrane and provide water savings. Toyota Motor Manufacturing will present data showing lowered NTU and SDI and extended cleaning cycles for such membranes by use of these filters.

Discusser: Drew Johnson, Ph.D., P.E., University of Texas at San Antonio (*San Antonio, TX, USA*) ..... 3:25 PM
Closure & Floor Discussion ..... 3:35 PM
Coffee Break ..... 3:45 PM

PAPER: IWC 08-25 — 4:00 PM

IRON SPECIFIC RESIN: A NOVEL TECHNIQUE AND AN EXCELLENT CHOICE FOR REMOVAL OF IRON FROM GROUND WATER

Renu V. Saraf, Ion Exchange India Ltd (*Mambai, India*)

INDION ISR(Iron Specific Resin) is resin based patented product (207613/2007) having manganese dioxide as catalytic moiety. It enhances the oxidation of iron and converts the soluble iron (Fe++) to insoluble ferric hydroxide produced which can be filtered through bed. The media acts as catalyst, where manganese dioxide reduce to manganese oxide and ferric hydroxide is precipitated and during the backwash of media gets scored and manganese oxide is converted to manganese dioxide. Media is not consumed during the process and does not require chemicals to reactivate/recharge the media.

The paper mainly emphasizes on basics of catalytic media, existing iron removal technology, technical superiority, and commercial viability of the product.

Discusser: Rick Szilagyi, WesTech Inc. (*Rockton, IL, USA*) ..... 4:25 PM
Closure & Floor Discussion ..... 4:35 PM

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

DATE: Monday, October 27
TIME: 2:00-5:00 PM
ROOM: Executive Salon 2

This session will give operators of steam generation systems in oil refineries, petrochemical and chemical processing plants the chance to get answers to their water treatment problems and concerns. The discussions will be initiated by brief expert presentations on steam purity, boiler water chemistry control, condensate polishing, and the operation of steam reboilers in those plants. Following the presentations there will be a free-ranging period for attendees to ask the panelists for answers to their real-life problems. Questions may be submitted in writing prior to the session or from the floor during the session.

Session Chair: James Robinson, GE Water & Process Technologies (*Trevose, PA, USA*)
IWC Representative: David Simon, Cyrus Rice Water Consultants (*Pittsburgh, PA, USA*)

REPORT: IWC 08-26 **2:00 PM**

STEAM REBOILERS - THE GOOD, THE BAD AND THE UGLY

Douglas DeWitt-Dick, Champion Technologies (*Fresno, TX, USA*)

Steam and condensate systems in refineries and petrochemical complexes tend to be the poor stepchildren when compared operations and production. Steam reboilers, while an integral part of the process, would then be the illegitimate offspring of these stepchildren. While the damage mechanisms that result in condensate system failures are similar to those observed in steam reboilers, mitigation techniques vary. Water flooding, carbon dioxide wind-up, steam/water hammer and inappropriate reboiler selection represent a few of the factors affecting steam reboiler performance. This paper will discuss these concerns and offer some remedial actions.

REPORT: IWC 08-27 **2:20 PM**

CONDENSATE POLISHING AND RECLAMATION IN HYDROCARBON PROCESSING AND CHEMICAL PROCESSING STEAM PLANTS

Robert Holloway, Holloway Associates (*Etobicoke, ON, Canada*)

Condensate from heating, process and power generation is a valuable resource that is frequently contaminated in both steam and condensate phases. This paper reviews methodology used to remove dissolved/suspended solids and corrosive gases from condensate.

Coffee Break ..... 2:40 pm

REPORT: IWC 08-28 **3:00 PM**

INDUSTRIAL STEAM PURITY: REQUIREMENTS, PROPER SAMPLING AND PRACTICAL CONSIDERATIONS

Anton Banweg, Nalco Company (*Naperville, IL, USA*)

Steam purity is an important consideration in industrial steam generating systems. Deviation from the required steam purity of a system can cause deposition and/or corrosion situations that can result in efficiency losses, impact availability and in some cases create a safety concern. Unfortunately though, many times, steam purity from a boiler system may not be determined until a problem occurs. Typically isokinetic steam sampling nozzles are not installed in most boiler systems and when installation is attempted the proper installation requirements for those nozzles may not be able to be met within the actual steam piping arrangement in the boiler system.

This report will discuss system steam purity requirements, steam sampling system requirements and practical applications

REPORT: IWC 08-29 **3:20 PM**

EFFECTIVE MONITORING AND CONTROL OF BOILER FEEDWATER CHEMISTRY

Irvin Cotton, Arthur Freedman Associates, Inc. (*Newport, RI, USA*)

This paper reviews the new ASME recommended guidelines for sampling, monitoring and control of water chemistry in steam generating systems. Sample points and sampling frequency recommended, proper sampling techniques and problems as well as recommended analytical methods and interferences are covered. The need for site-specific water chemistry is discussed, including the requirements for process steam quality, potential contamination issues and meeting any manufacturer's requirements.

An overview of various refinery and petrochemical steam generating systems, including HRSG designs, and major water related common problems are reviewed. Methods to minimize corrosion in these systems and basic corrosion reactions throughout the cycle, along with chemistry guidelines and monitoring requirements are discussed.

Several case histories are briefly provided illustrating consequences of improper chemistry, monitoring and control.

Panel Discussion ..... 3:40 PM

CHALLENGES IN DEALING WITH FLUE GAS DESULFURIZATION PURGE WASTEWATERS

DATE: Tuesday, October 28
TIME: 8:00 AM-Noon
ROOM: Executive Salon 2

This session will address the challenges faced by power generating facilities in dealing with the purge wastewater produced by wet flue gas desulfurization (FGD) systems. The authors will discuss the application of various technologies to handle this wastewater stream and share system results as well as the lessons learned during the commissioning and operation of both full scale and pilot scale systems.

Session Chair: Colleen Layman, P.E., Bechtel Power Corporation (*Frederick, MD, USA*)
Discussion Leader: Robert Applegate, Graver Water Systems, LLC (*Cranford, NJ, USA*)
IWC Representative: Mark Cheresnowsky, GE Water & Process Technologies (*Gloucester, VA, USA*)

REPORT: IWC 08-30 — 8:00 AM

MERCURY REMOVAL IN FLUE GAS DESULFURIZATION WASTEWATER

Michael Pudvay, Infilco Degremont (*Richmond, VA, USA*); Robert Goltz, Dow Chemical (*Midland, MI, USA*)

Mercury control and removal is a growing concerning for the Utility Industry in Flue Gas Desulfurization (FGD) wastewaters. New effluent regulations on Mercury are mandating that FGD wastewater discharging to receiving stream meet 2 - 10 ppt effluent requirements. The removal of Mercury from FGD wastewater is especially challenging since it can be present in multiple forms: metallic mercury in the zero valence form, ionic mercury and organic mercury as dimethyl mercury and the interaction of these forms with high levels of salts present in the FGD wastewater. A description of the technology developed is presented herein along with actual test results from pilot-scale studies.

Closure & Floor Discussion ..... 8:20 AM

PAPER: IWC 08-31 — 8:30 AM

FULL SCALE OPERATION OF BIOLOGICAL TECHNOLOGY FOR THE REMOVAL OF SELENIUM FROM FGD WASTEWATERS

Jill Sonstegard and Tim Pickett, GE Water & Process Technologies (*Salt Lake City, UT, USA*); James Harwood, GE Water & Process Technologies (*Oakville, ON, Canada*); Danny Johnson, P.E., Progress Energy Carolinas Inc. (*Raleigh, NC, USA*)

To reduce sulfur dioxide emissions from the flue gasses produced while burning coal, Wet Flue-Gas Desulfurization (WFGD) systems are being employed at coal-fired power plants across the globe. These WFGD systems transfer sulfur and other compounds released during coal combustion from a gaseous phase to a liquid phase and then collectively contains them in a wastewater stream. These same facilities may also utilize Dibasic Acid (DBA) to increase WFGD efficiency. Treatment of the resulting wastewater in order to comply with increasingly stringent discharge limits presents itself as a formidable challenge. The untreated waste stream concentrations of soluble selenate can reach over 10 ppm as well as contain elevated levels of mercury, arsenic and other solublized heavy metals, all of which require removal prior to environmental discharge. Two power plants at Duke Energy and Progress Energy in North Carolina have employed ABMet® biological technology for the removal of these contaminants from WFGD blowdown. This paper will discuss the fundamentals of the biological reduction process; its demonstrated removal efficiency of selenium, nitrate, and other trace metals; the design and commissioning of the first two facilities; as well as the data compiled during the initial months of full-scale operation with an emphasis on the Progress Energy Roxboro Station.

Discusser: Bryan D. Hansen, Burns & McDonnell (*Kansas City, MO, USA*) ..... 8:55 AM
Closure & Floor Discussion ..... 9:05 AM
Coffee Break ..... 9:20 AM

PAPER: IWC 08-32 — 9:40 AM

DUKE ENERGY-CAROLINA'S STRATEGY, PROJECT EXECUTION AND INITIAL EXPERIENCE

William Kennedy, Orion Engineering, PLLC (*Charlotte, NC, USA*); Robert Wylie & Richard Baker, Duke Energy (*Charlotte, NC, USA*); Michael Riffe & Brian Heimbigner, Siemens Water Technologies Corp. (*Warrendale, PA, USA*); Timothy Pickett, GE Water Process & Technologies (*Salt Lake City, UT, USA*)

Duke Energy-Carolinas developed a FGD retrofit program for its Marshall, Belews Creek, Allen, and Cliffside stations to maximize standardization in both the FGD and associated wastewater treatment systems (WWTS). The WWTS at each station is presented in terms of the FGD purge quality, effluent discharge requirements, overall treatment strategy, system designs employed, and project execution approach. Initial experience and system performance for the completed WWTS at Marshall and Belews Creek will be presented along with lessons learned.

Discusser: Diane Martini, Sargent & Lundy (*Chicago, IL, USA*) ..... 10:05 AM
Closure & Floor Discussion ..... 10:15 AM

PAPER: IWC 08-33 — 10:30 AM

ZLD SYSTEMS INSTALLED FOR ENEL PLANTS IN ITALY

M. N. Rao, Aquatech International Corporation (*Canonsburg, PA, USA*); Sergio Donadono, ENEL (*Milano, Italy*)

Aquatech International Corporation was awarded the contract to supply and install ZLD systems to treat FGD waste water from five coal-fired power projects for ENEL (Ente Nazionale Energie Electtrica) in Italy. Each plant receives a wide variety of Coal that throws challenges in the treatment of this wastewater. Some of the challenges include high concentrations of suspended solids, dissolved ionic impurities e.g. calcium, magnesium, sulfate, heavy metals and chloride ions as well as large fluctuations in the FGD wastewater blowdown quantity and quality. Company has supplied the systems with softening the FGD waste stream as a pretreatment step before it is routed into the ZLD systems. This paper discusses design considerations and concept applied and compares the initial operational data from the plants commissioned.

Discusser: Michael C. Preston, Black & Veatch (*Overland Park, KS, USA*) 10:55 AM
Closure & Floor Discussion ..... 11:05 AM

CHALLENGES IN PRODUCED WATER TREATMENT

DATE: Tuesday, October 28
TIME: 8:00 AM-Noon
ROOM: Executive Salon 1

This session will cover a wide spectrum of operating experience and data of produced water treatment systems in enhanced oil recovery applications.

Session Chair: Robert Holloway, Holloway Associates (*Etobicoke, ON, Canada*)
Discussion Leader: Rudy Tamayo, Husky Energy (*Calgary, AB, Canada*)
IWC Representative: Manoj Sharma, Aquatech International Corporation (*Canonsburg, PA, USA*)

REPORT: IWC 08-34 **8:00 AM**

RESIN CLEANING OF SAC AND WAC RESINS IN SAGD - ENHANCED OIL RECOVERY (EOR) APPLICATIONS

Claude Gauthier, P.Eng., The Purolite Company (*Burlington, ON, Canada*); Kevin Depner, P.Eng., EnCana Foster Creek (*Bonnyville, AB, Canada*); Michael Mayne, BS ChE, IX Services (*Mimbres, NM, USA*)

This progress report discusses the many challenges and operating experience (OPEX) for a Steam Assisted Gravity Drain (SAGD) Enhanced Oil Recovery (EOR) facility for maintaining the ion exchange resins in a clean efficient operating state. A unique patented external resin cleaning system was piloted to clean severely fouled SAC resin from brackish and produced water applications.

Closure & Floor Discussion ..... 8:20 AM

PAPER: IWC 08-35 **8:30 AM**

PROFILING AND MINIMIZATION OF WAC AND SAC REGENERANT WASTE THROUGH CONDUCTIVITY RECYCLING

Guy Mommaerts, P.Eng., Ion Exchange Services (Canada) Inc. (*Elora, ON, Canada*); Melonie Marguerite Myszczyszyn, P.Eng., Canadian Natural Resources Ltd. (*Bonnyville, AB, Canada*)

Conductivity Analyzers have been successfully utilized to capture low conductivity waters below 30,000 μS/cm during entire produced water WAC and fresh/brackish water SAC regeneration sequence (including acid/caustic and brine regeneration steps). Implementation of the conductivity recycling has resulting in one third (33% +) of the regeneration waste being recaptured.

Discusser: Scott Mussbacher, Vista Project, LTD (*Calgary, AB, Canada*)... 8:55 AM
Closure & Floor Discussion ..... 9:05 AM
Coffee Break ..... 9:15 AM

PAPER: IWC 08-36 **9:30 AM**

ALKALINITY: THE JOKER IN THE PACK

Michael Bridle, Mibricon Ltd. (*Calgary, AB, Canada*)

Brackish water is now used as make-up water for once through steam generator feedwater. High concentrations of alkalinity in the brackish water if not treated appropriately can lead to serious consequences. The steam assisted gravity drainage processes are particularly at risk and this paper will address the implications.

Discusser: Joe B. Bodeux, Imperial Oil Resources (*Bonnyville, AB, Canada*)..... 9:55 AM
Closure & Floor Discussion ..... 10:05 AM

REPORT: IWC 08-37 **10:20 AM**

TREATMENT OF COAL BED METHANE PRODUCED WATER USING SHORT BED ION EXCHANGE

Michael Sheedy and Paul Robinson, Eco-Tec Inc. (*Pickering, ON, Canada*)

Coal bed methane produced water is a major problem in developing this resource. A pilot study of a short bed IX process treating this water is presented. The paper discusses issues related to CBM water, treatment methods, short bed technology, pilot test data, and design of a full scale system.

Closure & Floor Discussion ..... 10:40 AM

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

DATE: Tuesday, October 28
TIME: 8:00 AM-Noon
ROOM: Executive Salon 4

Operating cooling systems in a more environmentally friendly and efficient manner is the object of every manager of these systems. This session includes both mechanical and chemical approaches to improving cooling system performance and minimizing waste and inefficiency.

Session Chair: David Alley, Clearwater Systems (*Essex, CT, USA*)
Discussion Leader: Donald Johnson, Nalco Corporation (*Naperville, IL, USA*)
IWC Representative: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services (*Arvada, CO, USA*)

PAPER: IWC 08-38 **8:00 AM**

UNIQUE COOLING WATER EXCHANGER INSPECTION TECHNIQUE

Chris Friesen, P.Eng., NOVA Chemicals Corporation (*Red Deer, AB, Canada*)

In the past, cooling water exchanger inspections have been very subjective and inconsistent. A unique procedure has been developed to determine a Tube Obstruction Index (TOI) for the inlet and outlet passes of each inspected tube-side cooling water bundle.

Discusser: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services (*Arvada, CO, USA*)..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-39 **8:50 AM**

A NEW AID FOR MANAGING BIOFOULING IN COOLING SYSTEMS

Charles Ascolese, GE Water & Process Technologies (*Trevose, PA, USA*)

For various reasons, adequate control of biofouling is not always realized when using biocides alone. Historically, so-called "biodispersants" have been used in conjunction with registered and approved cooling water biocides to enhance biological control. Development of a new, highly effective, non-foaming cleaner for biofouled surfaces is discussed. Laboratory screening studies used in the evaluation of candidate compounds are described. Biofilm formation and the impact of biofouling on cooling systems are reviewed. Methods for monitoring sessile organisms and performance of the new product in the field are summarized.

Discusser: Andrew Cooper, Nalco Company (*Naperville, IL, USA*) ..... 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-40 **10:00 AM**

SOLID CHEMICAL PROGRAMS FOR SCALE AND CORROSION CONTROL IN COOLING WATER SYSTEMS: DELIVERING SUSTAINABLE DEVELOPMENT

Steven M. Bilek, Barbara E. Moriarty, Nathaniel Greene and Robert S. Walicki, Nalco Company (*Naperville, IL, USA*)

This paper will discuss new solid programs for scale and corrosion control in place of the more traditional liquids. These solid programs can contribute to sustainable development, and minimize safety concerns, while delivering the same performance as liquid analogs. The necessary new feed system will also be discussed.

Discusser: James Dromgoole, Fort Bend Services, Inc. (*Stafford, TX, USA*), ... 10:25 AM
Closure & Floor Discussion ..... 10:35 AM

PAPER: IWC 08-41 **10:50 AM**

COOLING WATER HARDNESS AND CHLORIDE REDUCTION (A NOVEL CHEMICAL TREATMENT)

Alan M. Yeoman, CHEMICO International, Inc. (*Duluth GA, USA*); Sam R. Owens and Rick Maxey, CHEMICO International, Inc. (*Corpus Christi, TX, USA*)

Hardness, chlorides and silica reduction as a concentrated fluid, is economical using a patented nontraditional chemical process. Chlorides are removed by increasing carrier chemical dosage and adding a modified chlorine generator. Filters can be used to achieve zero discharge. Minimal training is required for experienced water technologist.

Discusser: Aklima Hossain, P.E., HDR (*Ann Arbor, MI, USA*) ..... 11:15 AM
Closure & Floor Discussion ..... 11:25 AM

TUESDAY, OCT. 28

PAPER: IWC 08-51 **11:40 AM**

UTILIZATION OF SALT WATER AS THE SOURCE FOR MAKE-UP WATER IN WET COOLING TOWERS

Natasha Jones and Luc De Backer, Ph.D., Bechtel Power Corporation (*Frederick, MD, USA*)

Utilization of salt water in wet cooling towers can decrease the tower's thermal performance, increase the particulate matter (PM) emissions, and increase make-up and blowdown flow rates. This paper discusses tower design characteristics and material selections that will adequately accommodate the use of salt water.

Discusser: Ray Post, ChemTreat, Inc. , (*Glen Allen, VA, USA*) ..... 12:05 PM
Closure & Floor Discussion ..... 12:15 PM

ION EXCHANGE

DATE: Tuesday, October 28
TIME: 8:00-Noon
ROOM: San Antonio Ballroom

Ion exchange resins are used for many purposes and to maximize their performance in a water treatment system, the resins properties must be fully understood. This session includes a presentation where data from a PC-based simulator program is used to size an ion exchange system; a case study that quantify a resins performance; a second case study that evaluates long-term equipment performance and finally, a novel technique used to reduce sulfates.

Session Chair: Edward Nace, Rohm and Haas Company (*Philadelphia, PA, USA*)
Discussion Leader: Peter Midgley, Christ Water Technology Americas,LLC (*New Britain, CT*)
IWC Representative: James Sabzali, Thermax Inc. (*Novi, MI*)

PAPER: IWC 08-42 **8:00 AM**

DUAL FUNCTIONALITY ACRYLIC ANION RESIN IN A DEMINERALISER SYSTEM - A CASE STUDY AT INTERQUISA CANADA

Christian Beaule, The Purolite Company (*Gatineau, QC, Canada*); David Boulanger, Interquisa Canada (*Montreal, QC, Canada*)

Interquisa Canada requires very high purity demineralised water for its manufacturing processes. The packed beds with styrenic strong base anion resin, followed by a mixed bed demineraliser were exceeding the <0.4 mS/cm limit for demineraliser water production. The root cause was a high leakage of organics through the demineraliser system.Purolite A-870 dual functionality acrylic anion resin replaced the styrenic resin in the packed beds. For over 3 years now, this new resin has enabled Interquisa to produce the desired demineralised water quality.

Discusser: Thomas Schendel, Mechanical Engineering Company (*Houston, TX, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-43 — 8:50 AM

ION EXCHANGE SIMULATORS

Michael Gottlieb, ResinTech, Inc. (*West Berlin, NJ, USA*)

Ion exchange simulation software provides effluent profiles for almost any ion exchange reaction. The ability to look at the behavior of all the ions in a dynamic fashion provides new insight into how ion exchange systems really work. Simulators can show chromatographic peaking as well as subtle changes in leakage caused by interactions of the various ions in the liquid and resin phase. Models of ion exchange systems can be used as a tool in the process design of an ion exchange system and as a troubleshooting tool to examine behavior of systems already in operation.

Discusser: Jim Summerfield, The Dow Chemical Company (*Midland, MI, USA*) 9:15AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-44 — 10:00 AM

SQUEEZING A FEW MORE YEARS OF LIFE FROM A 30+ YEAR OLD PACKED BED DEMINERALIZER

Peter Meyers, ResinTech, Inc. (*West Berlin, NJ, USA*)

The packed bed demineralizers at the IMC Sterlington facility in Bartow Fl have been in continuous operation for some 35 years now. Although the units have provided billions and billions of gallons of DI water over the years, their operation has been a challenge. The original internal distribution system design has been the source of many problems over the years, from resin leakage, to structural failures, to flow restrictions caused by resin fines. Controls and instrumentation have long since been converted from electromechanical type to PLC but the basic hardware is still original equipment from the 70's. This report chronicles the operation and maintenance of this aging demineralizer.

Discusser: Jim Shivers, Ion Exchange, LLC (*Glendora, CA, USA*) ..... 10:25 AM
Closure & Floor Discussion ..... 10:35 AM

PAPER: IWC 08-45 — 10:50 AM

INNOVATIONS IN ION-EXCHANGE TECHNOLOGY FOR THE REMOVAL OF SULPHATE

David Kratochvil, Brad Marchant, Michael Bratty and Rick Lawrence, BioteQ Environmental Technologies Inc. (*Vancouver, BC, Canada*)

Many jurisdictions around the world are imposing tighter regulations for sulfate discharge, in response to rising concerns about the effect of sulfate on water quality, human health, and agriculture. New technologies, based on ion-exchange, can remove sulphate to comply with new regulations, at significantly lower cost than alternative processes.

Discusser: Parag Deval, Thermax Limited (*Novi, MI, USA*) ..... 11:15 AM
Closure & Floor Discussion ..... 11:25 AM

TUESDAY, OCT. 28

APPROACHES TO MINIMIZING MEMBRANE FOULING

DATE: Tuesday, October 28
TIME: 2:00-5:00 PM
ROOM: Executive Salon 2

This session focuses on membranes and the prevention of membrane fouling using various techniques. The presentations in this session deliver alternatives to conventional pretreatment for minimizing membrane fouling. Subjects of interest include comparison of conventional and membrane pretreatment, Influence of ultrafiltration on RO performance, cleaning and auditing of RO systems.

Session Chair: Jantje Johnson, Genesys North America (*Eden Prairie, MN, USA*)
Discussion Leader: Arun Mittal, Aquatech International Corporation (*Canonsburg, PA, USA*)
IWC Representative: Wayne Bernahl, W. Bernahl Enterprises Ltd. (*Elmhurst, IL, USA*)

PAPER: IWC 08-46 — 2:00 PM

COMPARING CONVENTIONAL AND MEMBRANE PRE-TREATMENT ON SEAWATER REVERSE OSMOSIS DESALINATION PLANTS

Paul Choules, Veolia Water Solutions & Technologies (*Houston, TX, USA*)

This paper describes a comprehensive approach to characterize raw seawater samples as well as the performance of seawater pretreatment processes at various seawater reverse osmosis plants worldwide. Case studies include plants with conventional pre-treatment, plants with membrane pre-treatment and one with a combination of both (hybrid pre-treatment).

Discusser: Michael Preston, Black & Veatch (*Overland Park, KS*) ..... 2:25 PM
Closure & Floor Discussion ..... 2:35 PM

PAPER: IWC 08-47 — 2:50 PM

ULTRAFILTRATION IMPROVES PERFORMANCE OF RO UNIT TREATING COOLING TOWER BLOW DOWN IN A ZERO LIQUID DISCHARGE (ZLD) PLANT

Venkat Jagannathan, Aquatech International Corporation (*Canonsburg, PA, USA*); Ramiro Rivera and Carlos Alequin, AES Puerto Rico LP (*Guayama, Puerto Rico*)

A power plant in USA uses treated city waste water / canal water (75% / 25%) for cooling makeup. The cooling tower blow down (~ 6 COC) is softened by a side stream softening clarifier. Portion of the softened water is further filtered through a gravity sand followed by a multimedia and green sand filters. The filtered water is then treated through a RO.

Discusser: Craig Cockerham, Fluor Corporation, (*Sugar Land, TX, USA*) .. 3:15 PM
Closure & Floor Discussion ..... 3:25 PM
Coffee Break ..... 3:40 PM

PAPER: IWC 08-48 **4:00 PM**

AUDITING A REVERSE OSMOSIS SYSTEM

Jane Kucera, Nalco Company (*Naperville, IL, USA*)

Audit of industrial systems, such as cooling systems, have been a common practice for years. These audits are used to assist in determining the condition of the system. Audits can identify problems with a system as well as point out weak areas where changes, such as up-grading equipment or operations, would improve performance. This paper describes how to audit a reverse osmosis system.

Discusser: Scott Beardsley, Dow Water Solutions (*Midland, MI, USA*).....4:25 PM
Closure & Floor Discussion .....4:35 PM

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

DATE: Tuesday, October 28
TIME: 2:00-5:00 PM
ROOM: Executive Salon 4

This session is an extension of the morning session and continues to discuss new approaches to managing and controlling cooling systems in an environmentally friendly and efficient manner.

Session Chair: William Beer, GE (*Trevose, PA, USA*)
Discussion Leader: Aklima Hossain, P.E., HDR (*Ann Arbor, MI, USA*)
IWC Representative: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services (*Arvada, CO, USA*)

PAPER: IWC 08-49 **2:00 PM**

PUCKORIUS SCALING INDEX AS APPLIED TO DOLPHIN (PULSED POWER) NON-CHEMICAL WATER TREATMENT

David Alley, Clearwater Systems (*Essex, CT, USA*); Paul Puckorius, Puckorius & Associates Inc. (*Arvada, CO, USA*)

The Puckorius Scaling Index (PSI) has been applied to both makeup and circulating water in evaporative cooling systems undergoing Dolphin (Pulsed Power) water treatment. When Dolphin water treatment was employed, the neutral point (scaling vs. dissolving) of the PSI was found to shift from 6.0 to 6.3. This shift is attributed to improved kinetics of calcium carbonate precipitation resulting from the use of Dolphin water treatment. When used with Dolphin water treatment, reference to the PSI as PSID will prevent confusion regarding the neutral point of the PSI scale. Kinetic limitations to the use of Dolphin water treatment are explored.

Discusser: Lorraine Huchler, P.E., CMC, MarTech Systems Inc. (*Lawrenceville, NJ, USA*).....2:25 PM
Closure & Floor Discussion .....2:35 PM

PAPER: IWC 08-50 **2:50 PM**

DEFINING GREEN TECHNOLOGY FOR COOLING WATER TREATMENT

James Green, Heisler Green (*Downers Grove, IL, USA*)

Many organizations use the marketing labeling of "Green" to increase profit margins. This presentation will examine current Green definitions from around the world, EPA standards, and materials/control selection to help operators understand the term "Green" as definable and measurable, with attainable standards, while discerning between truly green and marketing spin.

Discusser: Timothy Eggert, GE Water & Process Technologies (*Seal Beach, CA, USA*).....3:15 PM
Closure & Floor Discussion .....3:25 PM
Coffee Break.....3:40 PM

PAPER: IWC 08-52 **4:00 PM**

A NEW FRAMEWORK FOR THE MANAGEMENT OF COOLING SYSTEM DYNAMICS

Donald A Johnson, Nalco Corporation, (*Naperville, IL, USA*); Geoff Townsend, Nalco Corporation (*Northwich, Cheshire, UK*)

Open recirculating cooling towers are inherently highly variable systems. What may appear to be constant operation is actually a kinetic steady-state interaction of many time-dependent processes. Any change in these processes can upset the steady-state condition, causing what are commonly known as system upsets. These upsets can seriously compromise the efficiency of operation and the integrity of the asset. In this paper, the causes and consequences of system variability are examined. The limitations of the established calculation methods for tower characterization are enumerated. Two new frameworks are presented which use first principles and Monte Carlo methods to examine system variability and control system effectiveness. Examples of the use of an adaptive control framework to achieve effective response to system upsets are presented.

Discusser: Kumar Sinha, P.E., Bechtel Power Corporation (*Frederick, MD, USA*).....4:25 PM
Closure & Floor Discussion .....4:35 PM

PAPER: IWC 08-53 **4:50 PM**

DESIGN & CONSTRUCTION OF A RIVERBANK FILTRATION COOLING WATER SUPPLY FOR AN IGCC STATION

Henry Hunt, Ranney Collector Wells (*Columbus, OH, USA*)

Cooling water supplies developed by induced (riverbank) filtration from alluvial aquifers along rivers offer advantages over direct surface water supplies as suspended particulates (turbidity), organic matter and waterborne organisms (zebra mussels) can be eliminated, providing improved cooling water quality in meeting EPA Rule 316b. Several case studies will be presented.

Discusser: Colleen Layman, P.E., Bechtel Power Corporation (*Frederick, MD, USA*).....5:15 PM
Closure & Floor Discussion .....5:25 PM

	SAN ANTONIO BALLROOM	EXECUTIVE SALON 1	EXECUTIVE SALON 2	EXECUTIVE SALON 4
SUNDAY, OCTOBER 26				
6:00-8:00 PM	GET ACQUAINTED RECEPTION IN THE EXHIBIT HALL - TEXAS BALLROOM			
MONDAY, OCTOBER 27				
8:00-11:00 AM	CHALLENGES FACING NUCLEAR POWER PLANTS	CONDENSATE POLISHING	ASME SESSION: HYDROXIDE ALKALINITY	MONITORING THE KEY TO SUCCESSFUL WATER TREATMENT
11:15 AM	KEYNOTE SESSION			
12:00-7:00 PM	EXHIBIT HALL HOURS (LUNCHEON BUFFET 12:15-2:00) - TEXAS BALLROOM			
2:00-5:00 PM	ACHIEVING SUSTAINABILITY THROUGH RECYCLE/REUSE	LEGIONELLA	ASME SESSION: HYDROCARBON PROCESSING & CHEMICAL PROCESSING	PRETREATMENT
5:00-7:00 PM	WELCOME RECEPTION IN THE EXHIBIT HALL - TEXAS BALLROOM			
TUESDAY, OCTOBER 28				
8:00 AM-12 NOON	ION EXCHANGE	PRODUCED WATER TREATMENT	FLUE GAS DESULFURIZATION	COOLING SYSTEM OPTIMIZATION, PART 1
8:00 AM-2:00 PM	EXHIBIT HALL HOURS (LUNCHEON BUFFET 12:00-2:00 PM) - TEXAS BALLROOM			
2:00-5:00 PM	WASTEWATER TREATMENT IN RECYCLE/REUSE SYSTEMS	PRODUCED WATER	APPROACHES TO MINIMIZING MEMBRANE FOULING	COOLING SYSTEM OPTIMIZATION, PART 2
WEDNESDAY, OCTOBER 29				
8:00 AM-12 NOON	ZLD TECHNOLOGIES AND APPLICATIONS TREATMENT	ADVANCES IN REFINERY WASTEWATER	COMMISSIONING HIGH PRESSURE POWER PLANTS / TRACE CONTAMINANT REMOVAL	RECYCLE/REUSE ALTERNATIVES FOR POTW APPLICATIONS
1:00-5:00 PM	CONTINUING EDUCATION WORKSHOPS - SEE PAGES 48-50 FOR DETAILED SCHEDULE			
THURSDAY, OCTOBER 30				
8:00 AM - 5: 00 PM	CONTINUING EDUCATION WORKSHOPS - SEE PAGES 48-50 FOR DETAILED SCHEDULE			

SCHEDULE AT A GLANCE

PRODUCED WATER

DATE: Tuesday, October 28
TIME: 2:00-5:00 PM
ROOM: Executive Salon 1

This session will focus on evaporators designed for Stream Assisted Gravity Drainage (SAGD) facilities. The session begins with a discussion on wastewater reuse; innovations in the treatment of produced water for SAGD operations; full scale implementation and advances in SAGD evaporative produced water treatment and ends with a general discussion on factors to be considered before purchasing a water evaporator.

Session Chair: Donald Downey, Purolite Company (*Paris, ON, Canada*)
Discussion Leader: Peter Midgley, Christ Water Technology Americas, LLC (*New Britain, CT, USA*)
IWC Representative: James Sabzali, Thermax Inc. (*Novi, MI, USA*)

REPORT: IWC 08-54 **2:00 PM**

INNOVATIONS IN PRODUCED WATER TREATMENT FOR SAGD

Dorothy Neu, Keith Minnich, P.E., and Mark Nicholson, P.E., Veolia Water Solutions & Technologies (*Pewaukee, WI, USA*)

Discussion of new methods to improve produced water treatment with respect to operating, capital, and carbon emissions.

Closure & Floor Discussion ..... 2:20 PM

PAPER: IWC 08-55 **2:30 PM**

TECHNICAL ADVANCEMENTS IN SAGD EVAPORATIVE PRODUCED WATER TREATMENT

William Heins, GE Water & Process Technologies (*Bellevue, WA, USA*)

There has been a shift away from the use of warm lime softening and weak acid cation ion exchange for produced water treatment to the use of mechanical vapor compression (MVC) evaporation followed by high pressure drum-type boilers. About 18 SAGD produced water evaporators are operating or are in various stages of construction in Alberta and overseas. Since the commissioning of the first such evaporators in 2002, many technical advancements have occurred which have resulted in reduced operating costs, improved reliability, reduced scaling and fouling potential, improved distillate quality and improved boiler feed quality for steam generation.

This paper provides details of the technical advancements in evaporative produced water treatment based on full-scale operating data and lessons learned. It also presents improved evaporator configurations, discusses improvements in contaminant reduction and scale prevention systems, demonstrates how capital and operating costs can be drastically reduced as compared to earlier evaporator system designs, and provides recent advancements in modularization, evaporator disposal treatment, deoiling, membrane preconcentration, and zero discharge solids drying techniques.

Discusser: Jasbir Gill, Ph.D., Nalco Company (*Naperville, IL, USA*) ..... 2:55 PM
Closure & Floor Discussion ..... 3:05 PM
Coffee Break ..... 3:15 PM

PAPER: IWC 08-56 **3:35 PM**

AN INNOVATIVE APPROACH FOR PROCESSING "SAGD" PRODUCED WATER

Rafique Janjua, P.E., Fluor Corp. (*Sugar Land, TX, USA*)

SAGD produced water contains dissolved and suspended solids along with heavy emulsion of oil and colloidal silica and clay (s). In spite of extensive treatment units to reduce hardness and silica, the existing processes are unable to reduce emulsion to prevent OTSG's failure. New innovative treatment process removes this emulsion by chemical treatment, reduces hardness to non detectable level with less chemicals, less equipment, and produces minimum solid waste.

Discusser: Peter Midgley, Christ Water Technology Americas, LLC (*New Britain, CT, USA*) ..... 4:00 PM
Closure & Floor Discussion ..... 4:10 PM

WASTEWATER TREATMENT IN RECYCLE/REUSE SYSTEMS

DATE: Tuesday, October 28
TIME: 2:00-5:00 PM
ROOM: San Antonio Ballroom

Recycle and reuse systems use innovative methods to reuse water that has historically been discharged. They also generate blowdown streams that create wastewater treatment challenges. This session will present recycle and reuse techniques that have been applied for reducing industrial water use and will present interesting wastewater treatment processes that have been used in treating blowdown streams

Session Chair: David A. Velegol, Chester Engineers (*Pittsburgh, PA, USA*)
Discussion Leader: Jerry L. Penland, Chester Engineers (*Pittsburgh, PA, USA*)
IWC Representative: John T. Lucey, Jr. P.E., HDR Engineering, Inc. (*Pittsburgh, PA, USA*)

PAPER: IWC 08-57 **2:00 PM**

UNIQUE WASTEWATER PROCESSING APPLICATION AT RIVER BEND NUCLEAR STATION

Tracy Barker and Jim Braun, AVANTech, Inc. (*Columbia, SC, USA*)

River Bend Station (RBS) is a 1040 MWe Boiling Water Reactor (BWR), operated by Entergy Nuclear, that installed new equipment to process liquid radioactive waste. This new equipment process, OzonexTM which incorporates an advanced oxidation process and membrane technology, became fully operational in June 2004. This paper provides a full description of the new process as well as the traditional filtration and ion exchange equipment that it replaced. Lessons learned associated with retrofitting this OzonexTM process into an operational nuclear facility and training plant operations personnel are discussed. Specific design and operational parameters/benefits discussed in the paper include:

- Selection of equipment to address historical liquid waste processing issues
- Integration of in-line ozone to reduce TOC and conductivity prior to reverse osmosis
- Operational results, including reactor chemistry, offsite discharges and waste generation

• Operating results show that the OzonexTM advanced water processing technologies have aided River Bend in processing liquid radioactive waste while improving product water quality and lowering solid radwaste generation throughout the plant.

Discusser: Enos Stover, Ph. D., P.E., DEE, The Stover Group (Stillwater, OK, USA) ..... 2:25 PM

Closure & Floor Discussion ..... 2:35 PM

PAPER: IWC 08-58 2:50 PM

WASTEWATER TREATMENT CHALLENGES FROM AN ETHANOL PLANT RECYCLE SYSTEM

Thomas Lawry, HDR Engineering, Inc. (*Pittsburgh, PA, USA*)

Several types of water are required to support the production of ethanol, including production process water, boiler feed water, and cooling tower makeup water. A base process of filtration, reverse osmosis (RO), and ion exchange is typically used to produce this water. Most of the water is recycled within the plant while a portion is discharged in a blowdown stream combining the RO reject, cooling tower blowdown, filter backwash, and softener regeneration. This presentation describes the challenges faced by a particular 110 million gallon per year ethanol plant that utilizes groundwater with fluoride contamination as source water. This plant discharges the blowdown to a nearby stream and was granted an NPDES permit with low permissible fluoride levels. Similar challenges exist for ethanol plants using a fluoridated municipal water supply as makeup to their water system.

Discusser: William Willersdorf, Siemens Water Technologies (*Bridgewater, NJ, USA*) ..... 3:15 PM

Closure & Floor Discussion ..... 3:25 PM

Coffee Break ..... 3:40 pm

REPORT: IWC 08-59 4:00 PM

SUSTAINABLE WASTEWATER REUSE IN UPGRADING OF ALBERTA OIL SANDS

Prit Kotecha, Suncor Energy Inc. (*Fort McMurray, AB, Canada*)

At Suncor Energy Oil Sands (Suncor) in Fort McMurray, Alberta, fresh water is withdrawn from the Athabasca River for cooling, utility, and fire water requirements in the extraction, upgrading, and energy services plants. Most of this water is returned to wastewater ponds after once through use and discharged to the river. To reduce overall fresh water usage, Suncor developed a sustainable wastewater reuse strategy and near zero liquid discharge (ZLD) plan.

Closure & Floor Discussion ..... 4:20 PM

TUESDAY, OCT. 28

PAPER: IWC 08-60 4:30 PM

WATER CONSERVATION AT LINDSAY OLIVE GROWERS

Naomi Levy, Infilco Degremont Technologies (*Richmond, VA, USA*)

Water reclamation, reuse, recycle, return and recovery are already quite established practices in many industries. However, the reduction, removal and minimization of water consumption is an issue that needs to be addressed more vigorously and needs to be further applied in the industrial facilities. Thus, efforts in water conservation should be focused on reducing the water usage upstream in the processes. This initiative is leading to new technologies, improved procedures and innovative ideas on how to preserve water.

This presentation will describe a case study on how a Water Reclamation Task Force at Lindsay Olive Growers in California was able to implement successfully water conservation ideas. The Task Force was able to accomplish approximately 40% reduction of fresh water usage and more than 95% removal of chloride from the plant effluent. The plant decreased its daily water consumption from about 800,000 gallons during peak season at 12,000 mg/L chloride concentration down to about 500,000 gallons at 500 mg/L chlorides. This work was accomplished within 4 years, from 1987 to 1991.

Discusser: Jerry L. Penland, Chester Engineers (*Pittsburgh, PA, USA*) ..... 4:55 PM

Closure & Floor Discussion ..... 5:05 PM

COMMISSIONING HIGH PRESSURE POWER PLANTS

DATE: Wednesday, October 29
TIME: 8:00-10:00 AM
ROOM: Executive Salon 2

This session focuses on practices and recently proposed commissioning limits for high pressure combined cycle facilities to reduce chemistry-related delays during commissioning. Practices for avoiding deposits, corrosion, or chemistry upsets in steam/water cycle components also are discussed. The session will consist of one paper, two or more prepared discussions, and a panel discussion.

Session Chair: Robert Bartholomew, Sheppard T. Powell Associates LLC (*Baltimore, MD, USA*)
Discussion Leader: William Moore, Fluor Corporation (*Sugar Land, TX, USA*)
IWC Representative: Michael Gottlieb, ResinTech (*West Berlin, NJ, USA*)

PAPER: IWC 08-61 — 8:00 AM

CHALLENGES IN MEETING CONDENSATE, FEEDWATER, AND STEAM/WATER QUALITY LIMITS DURING STARTUP AND COMMISSIONING OF MULTI PRESSURE COMBINED CYCLE POWER PLANTS-EPC PERSPECTIVE

Christopher Huth, Colleen Layman, P.E., and Kumar Sinha, P.E., Bechtel Power Corporation (*Frederick, MD, USA*)

Discussed are future challenges to the chemistry control for HRSGs with multiple pressure drums during startup and commissioning as well as during long-term normal operation and challenges / suggested solutions with respect to volatility of salts in the steam, phosphate hide-out, corrosion, phosphate treatment, and deposition around the cycle during the startup and commissioning of combined cycle power plants. The chemistry achieved during startup and commissioning will also be compared with EPRI Guidelines and commented from an EPC Contractor perspective. Finally, utilizing steam, feed water, and condensate water quality data obtained from previous plants startup experience, several conclusions and recommendations will be made concerning the most practical and achievable startup chemistry limits.

Discusser: William Moore, Fluor Enterprises, Inc. (*Houston, TX, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PANEL DISCUSSION — 8:50 AM

William Moore, Fluor Enterprises, Inc. (*Houston, TX, USA*) Teri Robertson, Siemens Energy, Inc. (*Orlando, FL, USA*), Christopher Huth, Bechtel Power Corporation (*Frederick, MD, USA*), Teri Robertson, Siemens Energy, Inc. (*Orlando, FL, USA*), Robert Bartholomew, Sheppard T. Powell Associates LLC (*Baltimore, MD, USA*)

ADVANCES IN REFINERY WASTEWATER TREATMENT

DATE: Wednesday, October 29
TIME: 8:00 AM-Noon
ROOM: Executive Salon 1

The process-intensive refining and petrochemical industry demands environmental challenges to protect water, soil and atmosphere from wastewater generated by refineries, petrochemical industry, and off-shore platforms. These contain hydrocarbons, phenols, amines, ammonia nitrogen, BTEX compounds, bio-refractory contaminants, heavy metals, total dissolved solids and many other hazardous materials. This technical session presents diverse technologies such as - simple oil/water separation using covered circular separators; use of Integrated Fixed Film Activated Sludge (IFAS) process to cost-effectively increase the treatment capacity of existing wastewater plants; treatment of bio-refractory contaminants present in refinery Desalter wastewater, biological regeneration of organoclays using a fluidized bed reactors; and impacts of FCCU scrubber purge water on refinery biological treatment.

Session Chair: Ramesh Kalluri, P.E., Kalluri Group, Inc. (*Houston, TX, USA*)
Discussion Leader: Donald Vacker, Bechtel Corporation (*Houston, TX, USA*)
IWC Representative: James Dromgoole, Fort Bend Services, Inc. (*Stafford, TX, USA*)

PAPER: IWC 08-63 — 8:00 AM

OIL / WATER SEPARATION TECHNIQUES APPLIED TO CIRCULAR DESIGNS

Tyson Gollaher, P.E , WesTech Engineering, Inc. (*Salt Lake City, UT, USA*); Rick Szilagyi, WesTech Engineering, Inc. (*Chicago, IL, USA*)

API Publication 421 has been the standard in gravity oil / water separation since its loose beginnings in 1948. These specific standards were developed and widely accepted for the design of rectangular oil / water separation units. Developments of other separation technologies offer the opportunity of improved separator efficiency and performance. This paper will discuss the separation principles compiled in API 421 for rectangular separators and investigate their relevance to the latest state-of-the-art circular design. This paper will also include a case study of current installations presenting the applicability of this technology.

Discusser: Donald Vacker, Bechtel Corporation (*Houston, TX, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-65 — 8:50 AM

INTEGRATED FIXED-FILM/ ACTIVATED SLUDGE (IFAS) FOR REFINERY AND PETROCHEMICAL WASTEWATER TREATMENT PLANT UPGRADES

Casey Mueller and Russ Grillo, Frontier Refining, Inc. (*Cheyenne, WY, USA*); Ramesh Kalluri, Kalluri Group, Inc. (*Houston, TX, USA*); Sarah Hubbell and Wayne Flournoy, Entex Technologies, Inc. (*Chapel Hill, NC, USA*)

Integrated Fixed-Film/Activated Sludge (IFAS) technologies have been gaining wide popularity as an innovative and efficient treatment process for achieving

nitrification in refining and petro-chemical wastewater treatment plants. IFAS technologies are sometimes referred to as Hybrid systems as the process combines the benefits of fixed film systems into the suspended growth activated sludge process. Activated sludge not only provides process flexibility but also a high degree of treatment. Fixed film processes are inherently stable and resistant to organic and hydraulic shock loadings. Placing fixed film media into the activated sludge aeration tanks (bio-reactors) combines the advantages of both of these systems. This paper discusses the application of IFAS process at three different refining and petro-chemical wastewater treatment plants. At all of the applications, IFAS technology has proven to provide consistently superior treatment efficiency than a conventional activated sludge treatment process.

Discusser: Chuck Hewell, P.E., CP&Y, Inc. (*Houston, TX, USA*) ..... 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-66 **10:00 AM**

EVALUATING IMPACTS OF FCCU SCRUBBER PURGE WATER DISCHARGES ON REFINERY BIOLOGICAL TREATMENT

Frank Castaldi, Brown and Caldwell (*Austin, TX, USA*); Jeff Allen, P.E., Brown and Caldwell (*St. Paul, MN, USA*)

The impacts of FCCU wet scrubber blowdown on refinery wastewater biological treatment removal kinetics, nitrification, activated sludge process performance, sludge clarification and thickening, and aeration basin and clarifier system operation are discussed. Denitrification strategies to mitigate the impacts of high nitrate loads on treatment performance and the nutrient balance are described.

Discusser: James Dromgoole, Fort Bend Services, Inc. (*Stafford, TX, USA*) ..... 10:25 AM
Closure & Floor Discussion ..... 10:35 AM

REPORT: 08-64 **10:50 AM**

TANK INTERNAL FLOATING ROOFS DESCRIPTION AND SELECTION GUIDELINES

Michael J. Doxey, P.E, HMT Inc. (*Tomball, TX, USA*)

This report presents various technologies available to owners, designers, and operators for internal floating roofs. An internal floating roof is the most effective means of controlling emissions from tanks utilized in the refinery wastewater treatment plants. There are a number of types available on the market, each with certain advantages and disadvantages. Some of these technologies have been around for many years, and some are very new to the market. This will be an examination of each of the types of floating roofs available, and will compare the predicted emission savings from each type, as well as other factors such as longevity, fire resistance, and maintenance requirements.

Closure & Floor Discussion ..... 11:15 AM

WEDNESDAY, OCT. 29

RECYCLE/REUSE ALTERNATIVES FOR POTW APPLICATIONS

DATE: Wednesday, October 2
TIME: 8:00 AM-Noon
ROOM: Executive Salon 4

The recent demands for ever increasing levels of "green" appropriate water treatment is driving technological innovation in many areas. Developments in the new ethanol industry as well as from some more conventional sources have required unique waste water treatment solutions to comply with limited POTW capability. This session will explore different techniques being employed on various waste waters to lesson the impact on the local municipal systems. The technologies and recommendations to be discussed include reuse, evaporation and treatment.

Session Chair: Ralph A. Finizio, Pepper Hamilton LLP (*Pittsburgh, PA, USA*)
Discussion Leader: Christopher Howell, P.E., Crown Solutions (*Vandalia, OH, USA*)
IWC Representative: Bradley Wolf, P.E., Navigant Consulting (*Pittsburgh, PA, USA*)

PAPER: IWC 08-67 **8:00 AM**

KEEPING IT GREEN AT THE LANDFILL - COGENERATION, EVAPORATION AND MEMBRANE TECHNOLOGY FOR THE TREATMENT OF LANDFILL LEACHATE

Cristina Del Piccolo, Led Italia srll (*Zoppola, PN, Italy*); Tina Masters Odum, P.E., Crown Solutions (*Vandalia, OH, USA*)

A treatment approach for landfill leachate in France. The site contains two landfills, an older leachate and a young leachate. Reverse osmosis was used to treat the older leachate and evaporation for the newer leachate. Layout, performance and operating costs are presented after one year of operation.

Discusser: Brian Aylaian, Metcalf & Eddy/AECOM, (*Laurel, MD, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-68 **8:50 AM**

DESIGN CONSIDERATIONS FOR UPGRADING POTWS TO TREAT POWER PLANT WASTEWATER DISCHARGES

Brian Aylaian and Hong Yin, Metcalf & Eddy/AECOM (*Laurel, MD, USA*)

This paper presents an overview of the challenges encountered by power plant designers and small POTWs in planning and designing upgrades or replacement to effectively treat industrial wastes discharges by power generation facilities. A design example with sample data and analysis will be presented.

Discusser: David McBain, N.A. Water Systems (*Moon Twp., PA, USA*) ..... 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-69 **10:00 AM**

TECHNICAL RISK ASSESSMENT OF WATER REUSE IN CONSIDERATION OF EMERGING POLLUTANTS

Christopher Stacklin, P.E., and Jerry Evangelista, P.E., Orange County Sanitation District (*Fountain Valley, CA, USA*)

The Groundwater Replenishment System is one of the largest water reuse projects in the United States. The project currently produces 70 million gallons per day (MGD) of drinking quality water with planning underway to increase capacity to 100 MGD.

The Groundwater Replenishment System is heavily integrated with Orange County Sanitation District's Reclamation Plant No. 1 which converts about 91 MGD of raw sewage to secondary treated effluent. Secondary treated effluent from Orange County Sanitation District is converted to drinkable water using state-of-the-art technology including microfiltration, reverse osmosis and advanced oxidation processes.

To ensure that the Groundwater Replenishment System product water is both safe and of the highest quality, Orange County Sanitation District's Source Control Division has developed an enhanced source control strategy. Due to the vast number of emerging pollutants, a systematic method for prioritizing pollutants of concern for the purpose of source control was established. This is derived using a technical risk assessment methodology which looks at the potential impact of both conventional and emerging pollutants on the treatment systems.

This paper discusses the plant evaluation and methodology for technical risk assessment of the integrated facilities. The methodology includes development of removal efficiencies from mass balances, deterministic and probabilistic models in consideration of diurnal effects. Application of the methodology narrows down the list of priority pollutants that is effective and practical for implementation in a source control program.

Discusser: Alfonso Salinas, Crown Solutions (*Vandalia, OH, USA*) ..... 10:25 AM
Closure & Floor Discussion ..... 10:35 AM

PAPER: IWC 08-70 **10:50 AM**

POWER PLANT WATER CONSERVATION STRATEGIES

K. Andrew Markle, P.Eng., MPR Associates Inc. (*Alexandria, VA, USA*)

Water conservation is becoming an increasingly important challenge in the operation and siting of electrical generating stations. To meet this challenge, a combination of new and conventional technologies is required. This paper will compare the impact of sixteen (16) alternative water use and control strategies. For each strategy, the benefits, risks, and costs will be discussed. Recommendations concerning the technologies that change a power generating station from a water consumer to a water producer will be provided.

Discusser: John Lucey, P.E., HDR (*Pittsburgh, PA, USA*) ..... 11:15 AM
Closure & Floor Discussion ..... 11:25 AM

WEDNESDAY, OCT. 29

ZERO LIQUID DISCHARGE (ZLD) TECHNOLOGIES AND APPLICATIONS

DATE: Wednesday, October 29
TIME: 8:00 AM-Noon
ROOM: San Antonio Ballroom

Due to increasing issues regarding the amount of water some industries require and the local environment's ability to sustain this demand, the use of zero liquid discharge (ZLD) technologies to maximize water reuse is becoming more significant. This session examines the use of ZLD both in technology reviews and discussion of actual applications.

Session Chair: Brian Powers, P.E., Fluor Power Group (*Charlotte, NC, USA*)
Discussion Leader: Devesh Mittal, Aquatech International Corporation (*Stafford, TX, USA*)
IWC Representative: Dennis McBride, Fluor Enterprises, Inc. (*Greenville, SC, USA*)

PAPER: IWC 08-71 **8:00 AM**

ACHIEVING RELIABLE ZERO LIQUID DISCHARGE (ZLD) TREATMENT OF GREY WATER AT A INTEGRATED GASIFICATION COMBINED CYCLE (IGCC) POWER PLANT

Lanny Weimer, GE Water & Process Technologies (*Ellicott City, MD, USA*); Carolina Gonzalez and Robert Solomon, GE Water, RCC Thermal Products

Integrated Gasification Combined Cycle (IGCC) operations generate highly concentrated wastewater (gray water). Gray water presents significant challenges for a Zero Liquid Discharge (ZLD) wastewater treatment system. A laboratory test program was conducted to meet these technical challenges. Paper discusses commercial scale ZLD system successfully treating gray water for six years.

Discusser: William Moore, Fluor Enterprises, Inc. (*Houston, TX, USA*) ..... 8:25 AM
Closure & Floor Discussion ..... 8:35 AM

PAPER: IWC 08-72 **8:50 AM**

EVAPORATION OF WASTEWATERS CONTAINING HIGHLY SOLUBLE SALTS

William Shaw, P.E., HPD, a Veolia Water Solutions & Technologies Company (*Pewaukee, WI, USA*)

This paper will discuss the impact of high solubility on the design of ZLD processes and the economics of evaporation. Issues such as high boiling point elevation, the use of noble materials of construction to resist corrosion, and the choice of energy input will be discussed.

Discusser: Mike Preston, Black and Veatch (*Overland Park, KS, USA*) 9:15 AM
Closure & Floor Discussion ..... 9:25 AM
Coffee Break ..... 9:40 AM

PAPER: IWC 08-73 **10:00 AM**

NAVAJO GENERATING STATION -- 25 YEARS OF ZLD

Robert Peterson and Jerry Kroger, Navajo Generating Station (*Page, AZ, USA*); Timothy Rittof, HPD, LLC (*Plainfield, IL, USA*)

The Navajo Generating Station was among the first coal-fired power stations in the U.S. to be designed as a Zero Liquid Discharge facility and the first to use a brine crystallizer rather than evaporation ponds. The ZLD systems were installed with the capacity to recover 1,500 gpm of water and still have that capacity today.

Discusser: Michael Wisdom, P.E., ContourGlobal (*Houston, TX, USA*) .... 10:25 AM
Closure & Floor Discussion ..... 10:35 AM

PAPER: IWC 08-74 **10:50 AM**

USE OF HIGH EFFICIENCY REVERSE OSMOSIS (HERO), BRINE CONCENTRATION AND CRYSTALLIZATION AT THE WORLD'S FIRST TWO ZERO LIQUID DISCHARGE (ZLD) ETHANOL PLANTS.

Russell Vandenberg and Nimai Miller, GE Water & Process Technologies, RCC Thermal Products (*Bellevue, WA, USA*); William McClain, GE Water & Process Technologies (*Phoenix, AZ, USA*)

As demand for a domestically sourced, renewable fuel increases, ethanol output is expected to grow to nearly 13 billion gallons by 2009. However, the ethanol industry is facing stronger and stronger headwinds as this growth puts a substantial strain on the country's water supply. For example, between three and six gallons of water are needed to produce one gallon of ethanol. To help reduce these hurdles for growth, GE Water & Process Technologies has developed the world's first HERO plus ZLD system that will enable Ethanol plants to reuse high purity water for use as boiler make-up, cooling tower make-up, and process needs.

Along with a limited fresh water supply, the ethanol industry is facing increasing regulatory pressure to reduce or eliminate wastewater discharge. This paper describes the design of the world's first two ZLD wastewater systems in the ethanol industry, that not only maximize water reuse, but protect the environment.

Discusser: Arun Mittal, Aquatech International (*Canonsburg, PA, USA*) 11:15 AM
Closure & Floor Discussion ..... 11:25 AM

WEDNESDAY, OCT. 29

TRACE CONTAMINANT REMOVAL

DATE: Wednesday, October 29
TIME: 10:10 AM-Noon
ROOM: Executive Salon 2

There was a time when water treatment was focused on the removal of "major" components – color, hardness and other ions, silica and iron. These impurities were often measured in levels of tens or hundreds of ppm. In industrial applications the primary objective was to reduce the incoming organic and ionic load to minimize any negative impact on hardware such as boilers and turbines However, increased awareness of the impact trace contaminants are having on the environment and health has led to an entirely new set of water treatment challenges. Often the contaminants are

Session Chair: David Smith, Calgon Carbon Corporation (*Pittsburgh, PA, USA*)
Discussion Leader: Anthony DeCola, LANXESS Sybron Chemicals Inc. (*Pittsburgh, PA, USA*)
IWC Representative: Craig Brown, Chemionex (*Pickering, Ontario, Canada*)

PAPER: IWC 08-75 **10:10 AM**

POROUS POLYMERS VIA MACRORETICULAR SYNTHESIS: NATURE AND APPLICATIONS

Robert L. Albright, Ph.D., Albright Consulting (*Southampton, PA, USA*)

The synthesis of porous organic polymers with a permanent open-cell pore structure made by the macroreticular synthesis will be presented. The nature, methods of characterization, and application of these porous organic polymers will be described.

Discusser: Bill Zavora, Calgon Carbon Corporation (*Pealuma, CA, USA*) ..... 10:35 AM
Closure & Floor Discussion ..... 10:45 AM

PAPER: IWC 08-76 **11:00 AM**

TRACE CONTAMINANT REMOVAL FROM GROUND AND WASTE WATERS WITH SELECTIVE AND NON-SELECTIVE MEDIA

H. Robert Goltz, Ph. D., The Dow Chemical Company (*Midland, MI, USA*)

Trace contaminants (such as arsenic, radium, uranium, perchlorate, boron, nitrate, mercury, fluoride, etc.) in ground water and waste water are coming under more and more scrutiny due to heightened regulatory pressure. In response to this demand, a wide variety of solutions have emerged. Some examples are reverse osmosis filtration, coagulation and filtration, inorganic media, selective removal media, non-selective removal media, microbiological processes and chemical degradation processes.

Dow Water Solutions has studied these contaminants and examined the different treatment options to develop a treatment options grid to assist customers in the evaluation of their treatment needs. Examples will be given of treatment options, removal capabilities, treatment costs and reliability.

Discusser: Chuck Guzelli and Peter Ritchey, Severn Trent Water Purification, Inc. (*Pittsburgh, PA, USA*) ..... 11:25 AM
Closure & Floor Discussion ..... 11:35 AM

CONTINUING EDUCATION WORKSHOPS

This year's workshops will cover relevant topics such as refinery wastewater treatment, water and wastewater treatment for produced water, fluidized gas desulphurization (FGD) wastewater treatment, and membrane treatment for desalination. The workshop program will also include traditional staples such as design and operation of reverse osmosis and ion exchange systems, cooling water treatment, and treatment of water for both high and low pressure boilers.

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. Advance registration and a separate fee is required All workshops are scheduled based on minimum reservations; please inquire at the conference registration desk about the current status of any of the workshops.

W-1: LOW PRESSURE BOILER WATER TREATMENT AND OPERATION

Instructor: James O. Robinson, GE Betz (*Trevose, PA, USA*)
Date: Wednesday, October 29; 1:00-5:00 PM

This workshop will cover the water quality required for medium and low pressure (<1500 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.

W-2: FGD WASTEWATER SYSTEMS DESIGN AND OPERATING CONSIDERATIONS

Instructor: Dr. Enos L. Stover, Ph. D., P.E., DEE, The Stover Group (*Stillwater, OK, USA*)
Date: Wednesday, October 29; 1:00-5:00 PM

This workshop provides a though review of FGD system operation and the problems commonly encountered. It reviews the methods and techniques that are available to control typical problems and the programs used for their minimization or control. This workshop provides practical and useful guidelines to identify the potential problems but also the chemical and mechanical methods that are in use today for their control. This information is of great help to operators and managers of FGD systems.

W-3: DESIGN AND OPERATION OF REVERSE OSMOSIS SYSTEMS

Instructor: Jantje Johnson, Genesys North America (*Eden Prairie, MN, USA*)
Date: Wednesday, October 29; 1:00-5:00 PM

This workshop provides information on pretreatment, design, and operation of reverse osmosis systems. Guidelines are provided for pretreatment, membrane selection, RO design and operation. Detailed discussions are provided on the operation and evaluation of RO systems and techniques for cleaning RO systems. Examples of various systems will be provided and discussed. This workshop is designed for RO system operators and designers to gather information, ask questions and solve problems in a workshop environment.

W-4: HIGH PRESSURE BOILER WATER TREATMENT AND OPERATION

Instructor: David G. Daniels, Mechanical & Materials Engineering (*Austin, TX, USA*)
Date: Thursday, October 30; 8:00 AM - Noon

This workshop will cover the water quality required for high pressure (>1500 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.

W-6: INTRODUCTORY WATER TREATMENT FOR THE POWER, CHEMICAL, AND REFINING INDUSTRIES

Instructors: Kumar Sinha, P.E., Bechtel Corporation (*Frederick, MD, USA*) and Dennis McBride, Fluor Enterprises, Inc. (*Greenville, SC , USA*)
Date: Thursday, October 30; 8:00 AM - Noon

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.

W-7: WATER AND WASTEWATER TREATMENT FOR PRODUCED WATER

Instructor: Michael Bridle, Mibricon Ltd. (*Calgary, AB, Canada*)
Date: Thursday, October 30; 8:00 AM - Noon

This workshop provides an overview of the current produced water treatment systems available that provide a final product quality to match the process requirement. The latter could include off shore disposal, reservoir pressure maintenance, deep well disposal or feed-water for Once Through Steam Generators or Drum Boilers. Four major areas will be covered including de-oiling, lime softening, ion exchange and total dissolved solids reduction (evaporation and membranes). Cost comparisons as appropriate will be presented. Emphasis will be placed on the challenges encountered, overcome and remaining and highlight the ongoing industry developments.

W-8: ION-EXCHANGE TECHNOLOGY AND PRACTICAL OPERATING PRACTICES

Presented by: Wayne Bernahl, W. Bernahl Enterprises, Ltd. (*Elmhurst, IL, USA*)
Date: Thursday, October 30; 1:00 – 5:00 PM

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.

W-9: COOLING WATER TREATMENTS AND IMPORTANT CONSIDERATIONS FOR REUSE WATER AND WATER CONSERVATION

Presented by: Paul Puckorius, Puckorius & Associates, Inc./Water Training Services (*Arvada, CO , USA*)
Date: Thursday, October 30; 1:00 – 5:00 PM

This course provides detailed information and considerations for implementing Reuse water in Cooling Tower Water Systems along with the modification in the water treatment requirements. Examples of various refinery/chemical plant reuse waters and treatments are discussed along with the advantages and cautions needed when reuse water replaces or supplements fresh water makeup to cooling tower systems. Guidelines are provided for the conversion from fresh water along with case histories of successful and unsuccessful conversions to reuse waters. This is a very practical workshop and is ideal for utility and management personnel. It covers the steps to follow for evaluating various reuse waters and control of deposition/corrosion/bio with monitoring techniques.

W-10: BIOLOGICAL WASTEWATER TREATMENT FOR REFINERIES/CHEMICAL PLANTS

Presented by: Dr. Enos L. Stover, Ph.D., PE., DEE, The Stover Group (*Stillwater, OK, USA*)
Date: Thursday, October 30; 1:00 – 5:00 PM

This workshop provides a review of refinery wastewater treatment technologies including, physical, chemical, and biological treatment. Technologies for oil/water separation, solids removal, and biological treatment will be discussed. With ever more stringent discharge regulations, including Whole Effluent Toxicity testing, etc, increasing production demands, changing crude qualities (sour crudes, etc) treatment requirements are more demanding and upgrades and expansions of treatment facilities are needed at many refineries. Innovative and alternative treatment approaches are needed at many refineries. This workshop will address both engineering and operations approaches for improvements of refinery wastewater treatment.

The IWC Exhibit Hall features 50 different opportunities to learn about practical and innovative solutions for the industrial water treatment industry from industry leaders. The Exhibit Hall is located inside Texas Ballroom across from the Conference Registration Desk, on the Second Floor (see inside front cover).

Hours of Operation are Sunday, October 26 from 6:00-8:00pm; Monday, October 27 from 12noon until 7:00pm and Tuesday, October 23 from 8:00am until 2:00pm. Join us for lunch on Monday and Tuesday! Also, during Sunday and Monday evening hours, join us for the Exhibitor-sponsored receptions. Open to all registered attendees!

Exhibitor Listing, by booth number
(For an Exhibitor Listing by Company name-alpha, please see pages 51-68)

1 Chemtrac Systems, Inc.
2 Dripping Wet Water, Inc.
3 Schreiber LLC
4 CHEMICO International, Inc.
5 Anderson Water Systems, Inc.
5 Water & Power Technologies
6 Puckorius & Associates, Inc.& Water Training Services
7 BJ Process and Pipeline Services Company
8 Hach Company
9 Golder Associates, Inc.
10 LANXESS Sybron Chemicals Inc.
11 Pall Corporation
12 ChemTreat, Inc.
13 Illinois Water Technologies
14 Rohm and Haas Company
15 Eco-Tec Inc.
16 Neptune Chemical Pump Co.
16 Waters Equipment Company
17 ResinTech, Inc.
19 BWA Water Additives
20 Westech Engineering
21 Integrated Separation Solutions, LLC (ISS)
22 Nalco Company
23 Pollution Equipment News/Rimbach Publishing Inc.
24 Severn Trent Services
25 Ecodyne Limited
25 Graver Water Systems, LLC
26 Sentry Equipment Corp.
27 Association of Water Technologies (AWT)
28 SAMCO Technologies, Inc.
29 Thermax Inc.
30 Veolia Water Solutions & Technologies
31 French Creek Software
32 Orica Watercare
33 Hydro Source LLC
34 Water Quality Association (WQA)
35 GE Water & Process Technologies
36 Siemens Water Technologies
37 Genesys North America
38 VRTX Technologies
39 Milton Roy
40 Aquatech International Corporation
41 Thermo Scientific
42 Industrial Analytics Corp.
43 Christ Water Technology Americas
44 ProMinent Fluid Controls, Inc.
46 Johnson March Systems, Inc.
47 TJ Technologies & Materials Inc.
48 Welmon, S de R.L. de C.V
49 Purolite Company
50 Niagara Blower Heat Transfer Solutions
51 Parkson Corporation

ANDERSON WATER SYSTEMS, INC.

Booth Number: 5
Contact: Sylvie Roy
Phone: 804-756-8423
Fax: 905-627-2381
Email: sylvie.roy@degremont.com
Website: www.degremont-technologies.com

Anderson Water Systems (Degremont Technologies – Anderson) is a leading provider of ultrapure water for power, oil & gas, mining, and chemical industries. Anderson Water Systems has over 55 years of expertise in the design, engineering, manufacturing and commissioning of industrial and municipal process water treatment systems with more than 3000 installations in 40 countries.

AQUATECH INTERNATIONAL CORPORATION

Booth Number: 40
Contact: Amy Bloom
Phone: 724-746-5300
Fax: 724-746-5359
Email: blooma@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.

ASSOCIATION OF WATER TECHNOLOGIES (AWT)

Booth Number: 27
Contact: Heidi Zimmerman
Phone: 240-404-6477
Fax: 301-990-9771
Email: awt@awt.org
Website: www.awt.org

AWT is a non-profit trade organization representing over 500 water treatment companies & suppliers throughout the US and internationally. These full-service companies specialize in the application of water treatments for industrial and commercial cooling and heating systems. AWT serves members by providing business and professional education and resource support.

BJ PROCESS AND PIPELINE SERVICES COMPANY

Booth Number: 7
Contact: Stewart Emmerson
Phone: 832-519-2060
Fax: 832-519-2001
Email: stewart.emmerson@bjservices.com
Website: www.bjservices.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.

BWA WATER ADDITIVES

Booth Number: 19
Contact: Erin Dawson
Phone: 678-802-3050
Fax: 678-802-3024
Email: erin.dawson@wateradditives.com
Website: www.wateradditives.com

BWA Water Additives is the leading global provider of specialty water solutions for industrial water treatment, desalination, and oilfield industries. With brands such as; Belclene®, BelcorÂ®, Belgard®, BromiCide®, Bellasol®, Belsperse®, Bellacide® and Flocon® , BWA'™s antiscalant, corrosion inhibitor and microbiocide technologies are recognized world wide for the highest possible quality and superior technical performance.

CHEMICO INTERNATIONAL, INC.

Booth Number: 4
Contact: Sam Owens
Phone: 361-883-8255
Fax: 361-883-5446
Email: 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.

Booth Number: 1
Contact: Robert Bryant
Phone: 770-449-6233
Fax: 770-442-1175
Email: chemtrac@chemtrac.com
Website: www.chemtrac.com

Chemtrac® Systems, Inc. provides start-to-finish on-line instrumentation to help water plant operators optimize the treatment processes. Streaming Current Monitors with remote DuraTrac Sensors, Particle Monitors, and Particle Counters help detect system failures and allow an immediate response to process changes. Water-borne disease outbreaks caused by Cryptosporidium and Giardia can be minimized.

CHEMTREAT, INC.

Booth Number: 12
Contact: Sydney Mosley
Phone: 804-935-2182
Fax: 804-965-6974
Email: 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.

CHRIST WATER TECHNOLOGY AMERICAS

Booth Number: 43
Contact: Peter Midgley
Phone: 860-306-6189
Fax: 860-223-0690
Email: pmidgley@christwater-americas.com
Website: www.christwater-americas.com

Christ Water Technology Americas is a custom designer and manufacturer of industrial water treatment equipment. Christ Water Technology supplies a broad spectrum of industries such as power generation, pulp and paper, oil and gas, chemical production, pharmaceuticals, food and beverage, plating and finishing, medical facilities, micro-electronics and mining. Christ Water Technology Americas is a supplier of the high pressure, high flow CONESEP condensate polishing system specifically designed for the power industry.

DRIPPING WET WATER, INC.

Booth Number: 2
Contact: Allison Sampson
Phone: 830-249-0805
Fax: 830-249-0010
Email: drippingwetwater@aol.com
Website: www.clo2ix.com

Dripping Wet Water's chlorine dioxide production systems have been proven in the Global Food Processing Industry and European Water Disinfection market. Using our patented technology that never mixes chemicals, our highly scalable systems are safe, accurate, and reliable and are now available to the North America water treatment market.

ECODYNE LIMITED

Booth Number: 25
Contact: Paul Kitchen
Phone: 905-332-1404
Fax: 905-332-6726
Email: info@ecodyne.com
Website: www.info@ecodyne.com

Ecodyne designs and manufacturers water treatment equipment and systems worldwide. Ecodyne offers deaerators, ion exchange equipment, reverse osmosis systems and EDI technology as well as cooling tower design, construction, upgrades and repairs. Principal markets include power generation, oil and gas, chemical, pulp and paper as well as municipal potable water.

ECO-TEC INC.

Booth Number: 15
Contact: Bonnie Goodspeed
Phone: 905-427-0077
Fax: 905-427-4477
Email: marketing@eco-tec.com
Website: www.eco-tec.com

Eco-Tec is a world leader in the innovative design and manufacture of water purification and chemical recovery solutions. With over 1,500 installations worldwide, Eco-Tec is a leader in advanced ion exchange technology. The patented Recoflo® process reduces installation and operating costs, prolongs resin life and maintains high product purity.

FRENCH CREEK SOFTWARE

Booth Number: 31
Contact: Robert Ferguson
Phone: 610-935-8337
Fax: 610-935-1008
Email: robferguson@frenchcreeksoftware.com
Website: www.frenchcreeksoftware.com

French Creek develops and markets scale and corrosion software tools for water treatment professionals. Standard packages include industry standard WaterCycle® for cooling, hyd-RO-dose™ for membrane systems, WatSim™ for potable, MineSAT™ for mining and waste water, DownHole SAT for oil field. Private label available. Windows DLLs and UNIX libraries available for controllers, web apps, and in-house applications.

GE WATER & PROCESS TECHNOLOGIES

Booth Number: 35
Contact: Mark Cheresnowsky
Phone: 804-693-6194
Fax: 804-695-0384
Email: mark.cheresnowsky@ge.com
Website: www.ge.com/water

GE Water & Process Technologies, a unit of GE Infrastructure, is a leading global supplier of water treatment, wastewater treatment, zero liquid discharge, and process systems solutions. GE delivers customer value by improving performance and product quality and by reducing operating costs and extending equipment life in a broad range of products and services. These products and services are used to optimize total water/process system performance, safeguard customer assets from corrosion, fouling and scaling, and protect the environment through water and energy conservation.

GENESYS NORTH AMERICA

Booth Number: 37
Contact: Wendy Rae
Phone: 360-435-7070
Fax: 360-435-7373
Email: wendy@genesysro.com
Website: www.genesysro.com

Genesys North America specializes in high performance membrane chemicals and services for reverse osmosis and nanofiltration systems. The membrane chemicals include antiscalants and cleaning chemicals. Services encompass cleaning optimization, plant audits and troubleshooting. The expertise of Genesys North America allows customers to reduce the total cost of their RO/NF operation.

GOLDER ASSOCIATES, INC.

Booth Number: 9
Contact: Kevin Conroy
Phone: 303-980-0540
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Email: kconroy@golder.com
Website: www.golder.com

Golder Associates is an employee-owned, global group of companies specializing in ground engineering, water treatment and environmental services. From 150 offices worldwide, our 6,500 employees work with clients who want to manage their environmental and engineering activities in a technically sound, economically viable and socially responsible manner.

GRAVER WATER SYSTEMS, LLC

Booth Number: 25
Contact: Robert Applegate
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Website: www.graver.com

Graver Water Systems, LLC designs and manufacturers water and wastewater treatment equipment and systems. Graver's engineers are knowledgeable in pretreatment, degasification, hot lime softening, boiler make-up, condensate polishing, wastewater treatment, cooling water treatment, and oil/water separation for industrial plants and electric utilities on a global basis.

HACH COMPANY

Booth Number: 8
Contact: Kathleen Dyekman
Phone: 866-450-4248
Fax: 970-669-2932
Email: orders@hach.com
Website: www.hach.com

Hach Company provides advanced water quality instrumentation systems for laboratory and on-line analysis and discharge compliance. Also offers test kits, chemistries and expert technical support.

HYDRO SOURCE LLC

Booth Number: 33
Contact: Don McGhee
Phone: 956-425-1110
Fax: 956-423-4994
Email: dmcghee@turbidex.com
Website: www.turbidex.com

Hydro Source, LLC. Specializes in turbidity reduction using its Turbidex™ Hyper Filtration Media. Turbidex™ Media is NSF61 certified and is used as an alternative to traditional sediment removal media's such as sand, anthracite and garnet. Our "Hyper Filtration" media provides particle removal down to 3 microns. Turbidex™ Media can be used in pressure or gravity filtration applications that require turbidity reduction and is ideal for RO pretreatment.

ILLINOIS WATER TECHNOLOGIES

Booth Number: 13
Contact: Melissa Gunsolus
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Website: illinoiswatertech.com

Illinois Water Technologies is an independent service and retrofit provider of water treatment equipment. We also stock ion exchange-resin, filter media and provide custom replacement parts as well as common vendor supplied components.

Our customers enjoy 24-hour availability, commitment to service, and cost savings that IWTech brings to the marketplace.

INDUSTRIAL ANALYTICS CORP.

Booth Number: 42
Contact: Nick Afragola
Phone: 203-245-0380
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Website: www.swan.ch

Industrial Analytics distributes the SWAN line of water quality instrumentation for power plant chemistry including sodium, oxygen, silica, pH/ORP, conductivity, degas cation conductivity, hydrazine, turbidity and disinfectant monitors. SWAN SYSTEMS offers complete project management. Capabilities include fabrication, installation and commissioning of water chemistry sampling systems.

INTEGRATED SEPARATION SOLUTIONS, LLC (ISS)

Booth Number: 21
Contact: John Scott
Phone: 262-736-4211
Fax: 262-736-4214
Email: jscott@isepsol.com
Website: www.isepsol.com

ISS's Water Group has extensive experience in engineering and manufacture of water purification equipment for the power industry: multimedia filters, softeners, reverse osmosis units, mixed-beds, condensate polishers with flows to 10,000 GPM.

JOHNSON MARCH SYSTEMS, INC.

Booth Number: 46
Contact: John Sands
Phone: 215-364-2500 x552
Fax: 215-364-5425
Email: john.sands@johnsonmarch.com
Website: www.johnsonmarch.com

Johnson March Systems is a custom designer and fabricator of chemical dosing systems, steam and water sampling panels, chlorination systems, ammonia feed systems, specialty skid mounted packages, and dust suppression systems. JMSI is ISO 9001-2000 certified by Underwriters Laboratories. JMSI has a full staff of mechanical, chemical, electrical, instrumentation and civil engineers.

LANXESS SYBRON CHEMICALS INC.

Booth Number: 10
Contact: Dwight Tamaki
Phone: 609-893-1100
Fax: 609-894-8641
Email: dtamaki@sybronchemicals.com
Website: www.ionexchange.com

Sybron Chemicals Inc., a Lanxess Company, provides world-class ion exchange resins to meet your needs. From cocurrent softening to condensate polishing. Lewatit MonoPlus uniform-particle size resins, and specialty resins, have proven their values across the water treatment market. Lanxess is also unique in its water treatment chemicals, including the Preventol® and Baypure® product lines, as well as Bayhibit® and Hydrazine Hydrate.

MILTON ROY

Booth Number: 39
Contact: Rita Dougherty
Phone: 215-441-0800
Fax: 215-441-8620
Email: info@miltonroy.com
Website: www.miltonroyamericas.com

Milton Roy is a global leader in fluid control and metering pump technologies, offering a broad range of pneumatic, hydraulic actuated, solenoid driven metering and centrifugal pumps and accessories that provide cost-effective reliable pumping solutions for chemical dosing and water removal to meet a wide range of industry needs.

NALCO COMPANY

Booth Number: 22
Contact: Kathy Stetenfeld
Phone: 630-305-2264
Fax: 630-848-3370
Email: cstetenfeld@nalco.com
Website: www.nalco.com

Nalco is the leading global provider of integrated water treatment and process improvement services, chemicals and equipment programs for a variety of industrial and institutional customers. We provide technologically advanced, engineered solutions that enable our customers to increase production yields, lower manufacturing costs, extend asset life and maintain environmental standards.

NEPTUNE CHEMICAL PUMP CO.

Booth Number: 16
Contact: Thomas R. O'Donnell
Phone: 215-699-8700
Fax: 215-699-0370
Email: tomo@neptune1.com
Website: www.neptune1.com

Neptune Chemical Pump Co. is a manufacturer of metering pumps, portable mixers, chemical feed systems, liquid polymer blending systems and glycol feed systems plus water treatment accessories including bypass feeders, bromine feeders, sample coolers, injection quills and corporation stops. In addition, Neptune manufactures relief valves, back pressure valves and calibration columns.

NIAGARA BLOWER HEAT TRANSFER SOLUTIONS

Booth Number: 50
Contact: Peter Demakos
Phone: 716-875-2000
Fax: 716-875-1077
Email: pgdemakos@niagarablower.com
Website: www.niagarablower.com

Niagara Blower is a design-build manufacturer providing engineered solutions to heat transfer applications at power, process, refinery, food and brewing facilities worldwide since 1904. Niagara's customized product lines include WSAC closed-loop, evaporative coolers and condensers and No-Frost® liquid desiccant dehumidification systems.

ORICA WATERCARE

Booth Number: 32
Contact: Stephanie Schnider
Phone: 303-268-5243
Fax: 303-268-5259
Email: stephanie.schnider@orica.com
Website: www.orica.com

Orica Watercare, a division of Orica Limited, supplies a range of water and wastewater treatment products and services for municipal and industrial applications in North America, Europe, Australia, and New Zealand. The largest supplier of water treatment products in Australasia, Orica supplies chlorine disinfectants, iron and aluminum salts, polyaluminum chloride, acids and alkalis as well as MIEX® Resin and treatment systems.

PALL CORPORATION

Booth Number: 11
Contact: Chris Crofts
Phone: 516-484-5400
Website: www.pall.com

Pall Power Generation is a global leader in providing filtration and separation products and services to the Power Generation industry, whether power is produced from fossil, nuclear, or renewable sources. Pall products are used to purify water, oils, and gases in every stage of the power cycle.

PARKSON

Booth Number: 51
Contact: Monica Rodriguez
Phone: 847-837-4943
Fax: 847-816-3707
Email: mrodriguez@parkson.com
Website: www.parkson.com

Parkson Corporation is a supplier of innovative, cost effective solutions for potable water, process water, and industrial and municipal wastewater treatment. Since 1971, Parkson has Provided its Customers with Superior, Cost-Effective Components and Systems For Water and Wastewater Treatment.

POLLUTION EQUIPMENT NEWS/RIMBACH PUBLISHING INC.

Booth Number: 23
Contact: Karen Galante
Phone: 412-364-5366
Fax: 412-369-9720
Email: karen@rimbach.com
Website: www.rimbach.com

POLLUTION EQUIPMENT NEWS, reaches over 90,000 professionals responsible for air, water, wastewater pollution control and hazardous waste disposal. INDUSTRIAL HYGIENE NEWS, reaches over 68,000 professionals responsible for occupational safety, health, IAQ, emergency response and industrial hygiene instruments.

PROMINENT FLUID CONTROLS, INC.

Booth Number: 44
Contact: Scott Staniszewski
Phone: 412-787-2484
Fax: 412-787-0704
Email: sales@prominent.us
Website: www.prominent.us

ProMinent Fluid Controls, Inc. is a global manufacturer of chemical metering pumps, water quality instrumentation, specialized disinfection equipment, and pre-engineered or custom skidded systems serving the Water and Wastewater industries. We have proudly served the Municipal, Industrial and OEM markets in the United States for over 30 years.

PUCKORIUS & ASSOCIATES, INC.& WATER TRAINING SERVICES

Booth Number: 6
Contact: Paul Puckorius
Phone: 303-674-9897 FL 863-655-1036
Fax: 303-674-1453
Email: waterphd1@aol.com
Website: Puckorius.com and watertrainingservices.com

Puckorius & Associates, Inc. provides consulting services for cooling, boiler, waste, and all types of water systems. This includes troubleshooting, water treatment specifications & preparation, and independent evaluations.

Water Training Services provides workshops, manuals, papers, technical reports, and all types of training from basic to advanced for cooling, boilers, waste water, and all water systems for treatment selection to operator/management/ water treatment persons.

PUROLITE COMPANY

Booth Number: 49
Contact: Don Downey
Phone: 800-343-1500
Fax: 610-668-8139
Email: info@puroliteusa.com
Website: www.PUROLITE.com

Purolite's focus is the development, manufacture, marketing and support of resins for Ion-Exchange, Adsorbents, Catalysts, and Special Applications. With our market-leading team of field experts, global manufacturing capability and record of innovative research, Purolite® offers the most extensive range of products of any resin manufacturer.

RESINTECH, INC.

Booth Number: 17
Contact: David Malkmus
Phone: 856-768-9600
Fax: 856-768-9601
Email: ixresin@resintech.com
Website: www.resintech.com

ResinTech is a manufacturer and supplier of ion exchange resins, activated carbon and Aries Filterworks point-of-use DI Water loops and cartridges. Stop by to learn about our ULTRA line of pre-regenerated and mixed bed resins including MBD-ULTRA, the highest purity effluent mixed bed resin available.

ROHM AND HAAS COMPANY

Booth Number: 14
Contact: Ed Nace
Phone: 215-592-2312
Fax: 215-499-4534
Email: PatriciaFischer@rohmhaas.com
Website: www.rohmhaas.com

Rohm and Haas manufactures a complete line Ion Exchange Resins, and adsorbents for the treament industry. Amberlites®, Amberjet®, Ambersep®, and Amberpack® are Rohm and Haas trademarks.

SAMCO TECHNOLOGIES, INC.

Booth Number: 28
Contact: Robert Bellitto
Phone: 716-743-9000 ext. 232
Fax: 716-743-1220
Email: bellittor@samcotech.com
Website: www.samcotech.com

Skid mounted integrated turn-key solutions for pure/ultra pure/waste water and process filtration-separation. Innovative minimum waste/high yield water management and recovery solutions for produced water, boiler feed, condensate polishing, brine concentration/crystallization and Zero Liquid Discharge (ZLD). Exclusive licensee of Rohm & Haas Advanced Amberpack Deionization (ADI) technology.

SCHREIBER LLC

Booth Number: 3
Contact: Willliam Kunzman
Phone: 205-655-7466
Fax: 205-655-7669
Email: billk@schreiberwater.com
Website: www.schreiberwater.com

Serving Industrial & Municipal markets since 1979, Schreiber Corporation solves wastewater treatment problems through the application of energy-efficient, innovative, and proprietary equipment/process technology. Schreiber offers a complete system from head works to tertiary filtration. Our patented treatment processes such as the Continuous Sequencing Reactor® and compressible media filter "Fuzzy Filter®" combine effectiveness and efficiency to produce the industry's highest quality products.

SENTRY EQUIPMENT CORP.

Booth Number: 26
Contact: Sales Department
Phone: 262-567-7256
Fax: 262-567-4523
Email: sales@sentry-equip.com
Website: www.sentry-equip.com

Sentry Equipment Corp manufactures sample conditioning components and analysis systems for water and steam, supplying plant chemists and engineers with tools for accurate water chemistry control. Sample coolers, spiral tube and dual tube heat exchangers, pressure reducing valves, corrosion products samplers, and other water sampling equipment are Sentry's specialty.

SEVERN TRENT SERVICES

Booth Number: 24
Contact: Richard A. Mitman
Phone: 215-872-2157
Fax: 215-997-4062
Email: rmitman@stswater.com
Website: www.severntrentservices.com

Severn Trent Services is the leading supplier of disinfection systems utilizing chlorine,on-site sodium hypochlorite, chlorine dioxide,water meters, utlraviolet systems and filtration for water and wastewater systems.

Severn Trent also designs complete systems ans provides service support of equipment for industrial treatment systems.

SIEMENS WATER TECHNOLOGIES

Booth Number: 36
Contact: Sarah Zipse
Phone: 847-706-6912
Fax: 847-706-6933
Email: sarah.zipse@siemens.com
Website: www.siemens.com/water

Water and wastewater treatment are critical to every industry. Each industry has specifications for contaminant limits in the product water and effluent water. Siemens Water Technologies is ready to help you meet these requirements. With industry experts throughout our organization, we are able to provide you with a team that specializes in your marketplace. They understand your challenges and are able to help you develop the right solution.

THERMAX INC.

Booth Number: 29
Contact: Jim Sabzali
Phone: 248-474-3050
Fax: 248-474-5790
Email: jsabzali@thermax-usa.com
Website: www.thermax-usa.com

Thermax manufacturers different varieties of ion exchange resins for various applications in water treatment and specialty areas such as pharma, biotech, catalyst, sugar, metal recovery and more. Thermax resins are marketed under trade name Tulsion.

THERMO SCIENTIFIC

Booth Number: 41
Contact: Erin White
Phone: 978-232-6000
Fax: 978-232-1042
Email: info.water@thermo.com
Website: www.thermo.com/process

The Orion On-Line products from Thermo Scientific offer a full range of process monitors for applications where monitoring water is absolutely critical.

TJ TECHNOLOGIES & MATERIALS INC.

Booth Number: 47
Contact: Olina Woo
Phone: 86 21-51308736
Fax: 86 21-51308739
Email: info@tjtminc.com
Website: www.tjtminc.com

TJTM is a Technology and Service Oriented International Eco-Friendly Company with offices in Shanghai, New York and California providing value to our end-users and Manufacturing Industries across the globe.

VEOLIA WATER SOLUTIONS & TECHNOLOGIES

Booth Number: 30
Contact: Catherine Broderick
Phone: 815-609-2052
Fax: 815-609-2044
Email: catherine.broderick@veoliawater.com
Website: www.veoliawater.com

Veolia Water Solutions & Technologies offers unique technologies, process design, construction and installation of systems for Source Water Treatment, Water Recycle/Reuse and Zero Liquid Discharge. Our centers of expertise: HPD – Evaporation/Crystallization Processes, Whittier Filtration – Advanced Filtration Systems, N.A. Water Systems – Solutions for the Entire Water Cycle.

VRTX TECHNOLOGIES

Booth Number: 38
Contact: David Nicholas
Phone: 210-651-7402
Fax: 210-651-7538
Email: info@vrtxtech.com
Website: www.vrtxtech.com

VRTX Technologies specializes in environmentally-friendly chemical free treatment of water used in cooling towers and evaporative condensers. The VRTX system relies on kinetic energy, hydrodynamic cavitation, and chemical equilibrium to control scale, corrosion, and bio-fouling without the hazards of chemical treatment. VRTX also minimizes corrosion and microbiological growth, reduces system operating costs, and conserves water and energy.

WATER & POWER TECHNOLOGIES

Booth Number: 5
Contact: Bill Himebaugh
Phone: 800-494-2525
Fax: 801-973-9733
Email: william.himebaugh@wpt.com
Website: http://wpt.com/

A Degremont Technologies (SUEZ Environment) company, Water & Power Technologies is the premier treatment solution for a world that demands high purity water. Whether through our Waterpro (Build Own Operate "water by the gallon") operations or by supplying equipment, services or custom engineered systems, we provide water treatment solutions specific to your industry and needs. Our state-of-the-art engineering tools, specifically 3-D solids modeling, provide us with the power to maximize use of space and interfaces to assure efficient integration into your plant or facility. We invite you to take a look at how we safely and efficiently meet the important water treatment quality your facility demands.

WATER QUALITY ASSOCIATION (WQA)

Booth Number: 34
Contact: Tanya Lubner, PhD
Phone: 630-505-0160
Fax: 630-505-9637
Email: tlubner@wqa.org
Website: www.wqa.org

The Water Quality Association (WQA) is a not-for-profit international trade association representing the residential, commercial, industrial, and small community water treatment industry. WQA maintains a close dialogue with other organizations representing different aspects of the water industry in order to best serve consumers, government officials, and industry members.

WATERS EQUIPMENT COMPANY

Booth Number: 16
Contact: Brian Reichley
Phone: 215-699-8700
Fax: 215-699-8795
Email: brianr@watersequipment.com
Website: www.watersequipment.com

Waters Equipment has been building custom steam/water sampling and analysis systems for over 45 years. Additionally, we manufacture sample coolers, pressure reducers, refillable resin columns, high temperature shut-off valves, temperature control valves, portable samplers, multi-stream sequencers, single-point sampling conditioning modules, cooling water isolation skids and hotwell samplers.

WELMON, S DE R.L. DE C.V

Booth Number: 48
Contact: Idalia Reyes
Phone: (52)(1) (81) 80 46 46 00
Email: idalia.reyes@welmon.com.mx
Website: www.welmon.com.mx

With an area of 22,000 ft² divided into 3 bays and located in Guadalupe, N.L., México, metropolitan area of Monterrey, only 140 miles away from the border with the United States of America, Welmon is a company created to satisfy the needs of pressure vessels, heat exchangers and API storage tanks, for the chemical, petrochemical, power generation, utilities, waste environmental, paper and mining industries.

WESTECH ENGINEERING

Booth Number: 20
Contact: Jim Woods
Phone: 801-265-1000
Fax: 801-265-1080
Email: jwoods@westech-inc.com
Website: www.westech-inc.com

For raw water pretreatment, cooling water, water reuse, wastewater and potable water treatment, WesTech is your independent source for reliable industrial and municipal process treatment equipment designed, engineered, built for long lasting efficiency. For new plants, design build, and retrofits, WesTech offers the process, manufacturing and project management experience required.

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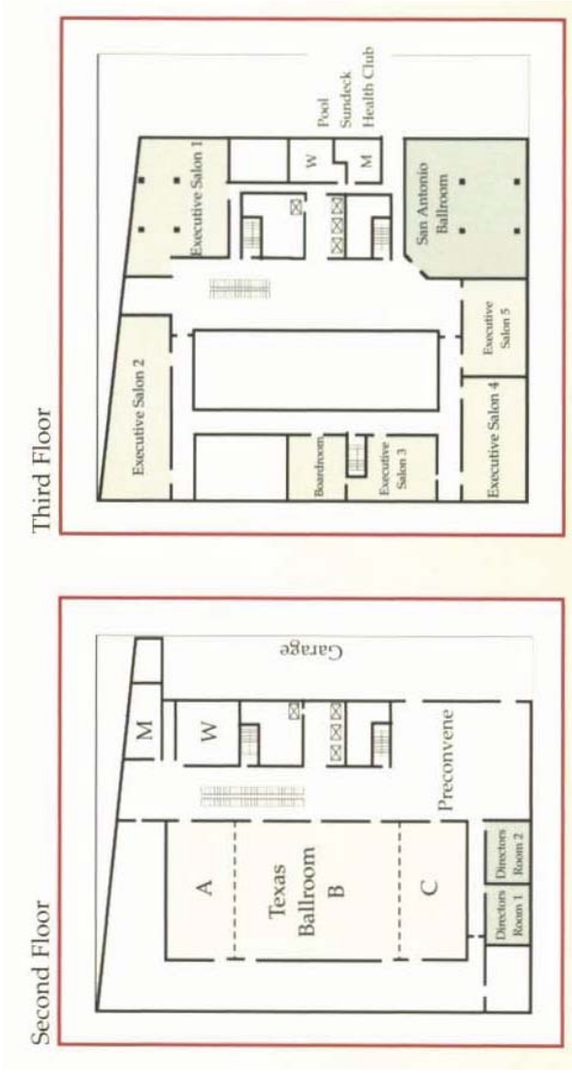

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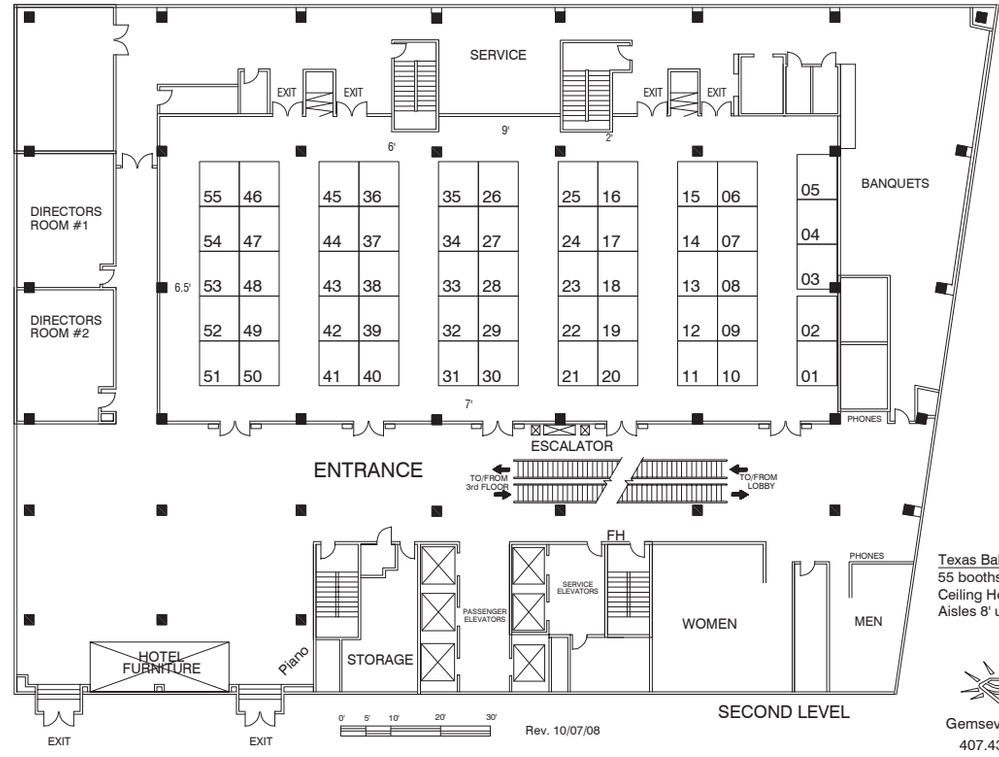

Exhibitor Listing, by booth number
(For an Exhibitor Listing by company name-alpha, please see pages 51-68

1 Chemtrac Systems, Inc.
2 Dripping Wet Water, Inc.
3 Schreiber LLC
4 CHEMICO International, Inc.
5 Anderson Water Systems, Inc.
5 Water & Power Technologies
6 Puckorius & Associates, Inc.& Water Training Services
7 BJ Process and Pipeline Services Company
8 Hach Company
9 Golder Associates, Inc.
10 LANXESS Sybron Chemicals Inc.
11 Pall Corporation
12 ChemTreat, Inc.
13 Illinois Water Technologies
14 Rohm and Haas Company
15 Eco-Tec Inc.
16 Neptune Chemical Pump Co.
16 Waters Equipment Company
17 ResinTech, Inc.
19 BWA Water Additives
20 Westech Engineering
21 Integrated Separation Solutions, LLC (ISS)
22 Nalco Company
23 Pollution Equipment News/Rimbach Publishing Inc.
24 Severn Trent Services
25 Ecodyne Limited
25 Graver Water Systems, LLC
26 Sentry Equipment Corp.
27 Association of Water Technologies (AWT)
28 SAMCO Technologies, Inc.
29 Thermax Inc.
30 Veolia Water Solutions & Technologies
31 French Creek Software
32 Orica Watercare
33 Hydro Source LLC
34 Water Quality Association (WQA)
35 GE Water & Process Technologies
36 Siemens Water Technologies
37 Genesys North America
38 VRTX Technologies
39 Milton Roy
40 Aquatech International Corporation
41 Thermo Scientific
42 Industrial Analytics Corp.
43 Christ Water Technology Americas
44 ProMinent Fluid Controls, Inc.
46 Johnson March Systems, Inc.
47 TJ Technologies & Materials Inc.
48 Welmon, S de R.L. de C.V
49 Purolite Company
50 Niagara Blower Heat Transfer Solutions
51 Parkson Corporation