



SEPTEMBER 9-12, 2015



2015 ANNUAL CONVENTION AND EXPOSITION

Omni Nashville Hotel and Music City Center

NASHVILLE, TENNESSEE

awt.org/annualconvention15





5 REASONS YOU SHOULD ATTEND



AWT's Annual Convention and Exposition continues to grow each year, yet it still remains the perfect size for professionals in our industry. With over 1,000 attendees, the meeting provides you with plenty of opportunities to increase your business connections and resources while maintaining its exclusive focus on industrial water treatment.



- 1** 98% of past attendees say they return to the office with practical knowledge they can implement immediately.
- 2** 93% of past attendees say the convention increases their industry knowledge.
- 3** Since 2010, attendance has grown by more than 21%—exposing you to more individuals with whom you can network.
- 4** Attendees are viewed as one of the biggest assets of the convention. The convention's noncompetitive atmosphere allows you to share your experiences, challenges, and concerns.
- 5** It's the only convention where you'll find exhibitors whose sole focus is industrial water treatment.



EVENTS

Wednesday

Golf Tournament 6:30 am – 2:00 pm

Our annual golf tournament will be held at the Hermitage Golf Course. The President's Reserve, designed by architect Denis Griffiths, trails through 300 acres of natural Tennessee wetlands and along the banks of the beautiful Cumberland River. The President's Reserve can offer golfers as much challenge as they desire, yet still be enjoyable for less experienced players. Don't forget that the proceeds from mulligans go to Tennessee Fisher House.



Women of Water Reception 6:30 pm – 7:30 pm

Join the Women of Water (WOW) to hear our special guest speaker, Loraine A. Huchler, founder and president of MarTech Systems, Inc., an engineering consulting organization that assesses and manages risk in water-related utility systems. Loraine will speak about the importance of mentors and share stories about the mentors she has had throughout her career.

CWT and New Member Reception (by invitation only) 7:00 pm – 8:00 pm

Two celebrations in one! AWT will be hosting a reception recognizing the significant accomplishments of those who have achieved the status of Certified Water Technologist (CWT) and welcoming our new AWT members.

Thursday

Young Professionals Happy Hour 5:15 pm – 6:15 pm

The AWT Young Professionals Group was created to provide a place for young professionals within the water treatment industry to learn, mingle, and grow. Join us for happy hour to meet with your peers in the industry.



Friday

AWT Annual Reception and Awards Dinner 6:30 pm – 10:30 pm

We'll be visiting the Country Music Hall of Fame® and Museum for our Annual Reception and Awards Dinner! You'll have the opportunity to take a tour of the museum, deemed the "Smithsonian of country music" because of its unrivaled collection. Plus, after dinner, we'll celebrate the achievements of the recipients of the Ray Baum Memorial Water Technologist of the Year and Supplier of the Year Awards.



LEARNING LOUNGE

These sessions are designed to be an informal way for attendees to share their own experiences and ideas. Be sure to stop by!

Thursday, September 10

- 11:00 am – 11:30 am **Best Ideas: Pretreatment Practices**
- 11:30 am – Noon **Filtration: Pretreatment, Boilers and Cooling Towers**
- 4:30 pm – 5:00 pm **Productive Ways to Use "Windshield Time"**
- 5:00 pm – 5:30 pm **Making Technology Work for You**

Friday, September 11

- 1:00 pm – 1:30 pm **Best Practices: Aluminum Boiler Guidelines**
- 1:30 pm – 2:00 pm **Best Practices: Cooling Water Do's and Don'ts**



Executive Portrait Lounge

Need to update your picture for your website, business card, or marketing materials? Take advantage of having a professional head shot taken by the convention photographer, Chuck Fazio Photography. The Executive Portrait Lounge will be open Wednesday through Friday, located next to Chillers Bookstore and Lounge.

Schedule-at-a-Glance (as of June 16, 2015)

	Exhibit Hall
	General Session
	Track I
	Track II



Tuesday, September 8

10:00 am – 5:00 pm **Registration Open**

10:00 am – 5:00 pm Exhibitor Move-In

Wednesday, September 9

6:30 am – 2:00 pm **AWT Golf Tournament**
Shuttle departs at 6:30 am from the hotel lobby. Tournament play begins at 8:00 am.

8:00 am – 7:00 pm **Registration Open**

8:00 am – 2:00 pm Exhibitor Move-In

2:30 pm – 4:00 pm **Technical Subcommittee Meetings**

<i>Boiler Subcommittee</i>	<i>Special Projects Subcommittee</i>
<i>Cooling Subcommittee</i>	<i>Wastewater Subcommittee</i>
<i>Pretreatment Subcommittee</i>	

4:00 pm – 4:30 pm **Moderator Training**
Moderators and AWT board members required to attend.

4:00 pm – 7:00 pm **Opening Reception – Exhibit Hall Open** *(Complimentary Reception)*

6:30 pm – 7:30 pm **Women of Water (WOW) Reception**
Guest Speaker: Loraine A. Huchler, CMC, MarTech Systems, Inc.

7:00 pm – 8:00 pm **CWT and New Member Reception** *(By Invitation Only)*

Thursday, September 10

7:00 am – 7:00 pm **Registration Open**

7:00 am – 8:30 am Continental Breakfast

7:00 am – 8:30 am Spouse/Guest Breakfast

7:30 am – 7:50 am	Commercial Corner <i>Wincom, Inc.</i>	Commercial Corner <i>TBA</i>
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8:00 am – 8:20 am	Commercial Corner <i>BWA Water Additives</i>	Commercial Corner <i>Tintometer Inc.</i>
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8:00 am – 5:00 pm Speaker Ready Room Open

8:30 am – 10:00 am **GENERAL SESSION – Annual Membership Town Hall Meeting**

Call to Order	Q&A Period – Committee Reports
President's Report	Q&A Period – Liaison Reports
New Business	Approval of Minutes from October 30, 2014
Q&A Period – Treasurer's Report	Adjournment

10:00 am – 11:00 am	KEYNOTE SESSION – Rock Solid Leadership <i>Robin Crow, Dark Horse Institute</i>	
11:00 am – 2:00 pm	Exhibit Hall Open <i>(Complimentary Lunch)</i>	
11:00 am – Noon	Learning Lounge Open Facilitator: James McDonald, PE, CWT 11:00 am – 11:30 am: Best Ideas: Pretreatment Practices Facilitator: Gary Garcia 11:30 am – Noon: Filtration: Pretreatment, Boilers and Cooling Towers	
11:30 am – Noon	Music City Center's Sustainability Procedures and LEED Certification <i>Amanda Littleford, Music City Center</i>	
12:30 pm – 2:00 pm	Past Presidents Luncheon	
2:00 pm – 4:00 pm	Exhibit Hall Open <i>(Private appointments can be scheduled if desired)</i>	
2:00 pm – 4:00 pm	Track I 2:00 pm – 2:30 pm Soft Skills: Communicating, Presenting, and Leading Jack Slaby, CWT <i>Weas Engineering, Inc.</i>	Track II 2:00 pm – 2:30 pm Photosynthesis—Inhibiting Biocide Solves Algae Fouling Problems in Recirculating Water Systems Jeffrey F. Kramer, Ph.D. <i>BWA Water Additives</i>
	2:30 pm – 3:00 pm Leveraging Limited Marketing Resources Karen Danielson <i>U.S. Water Services, Inc.</i>	2:30 pm – 3:00 pm An Improved Approach for Biofilm Control in Small to Medium Water Treatment Systems Christine E. McInnis, Ph.D. <i>Dow Microbial Control</i>
	3:00 pm – 3:30 pm Is Your Insurance Qualified for the Job? Donald L. Cleveland John Walsh <i>WaterColor Management</i>	3:00 pm – 3:30 pm Innovative and Unique Delivery System for Solid Oxidizing Biocide Provides Safer, Easier and Faster Application Method for Microbiological Control of Cooling Water Terry P. Goeman David Guy <i>King Technology, Inc.</i>
	3:30 pm – 4:00 pm Knowledge Management in Water Treatment James McDonald, PE, CWT <i>Chem-Aqua, Inc.</i>	3:30 pm – 4:00 pm A Biofilm Primer: The Relationship Between Biofilm and Water System Pathogens Diane Miskowski, MPH <i>EMSL Analytical Inc.</i>
4:00 pm – 7:00 pm	Exhibit Hall Open <i>(Complimentary Reception)</i>	
4:30 pm – 5:30 pm	Learning Lounge Open Facilitator: R. Trace Blackmore, LEED AP 4:30 pm – 5:00 pm: Productive Ways to Use "Windshield Time" 5:00 pm – 5:30 pm: Making Technology Work For You	
5:15 pm – 6:15 pm	Young Professionals Happy Hour	

Schedule-at-a-Glance

Friday, September 11

7:00 am – 9:00 am	Continental Breakfast (<i>Spouses/guests are welcome</i>)	
7:30 am – 8:45 am	Committee Breakfast Meetings Business Resources Committee Marketing/Communications Committee Certification Committee Membership Committee Convention Committee Technical Committee Education Committee Standards Task Force Legislative/Regulatory Committee Young Professionals Group	
7:00 am – 5:00 pm	Registration Open	
7:00 am – 5:00 pm	Speaker Ready Room Open	
8:00 am – 8:20 am	Commercial Corner <i>Special Pathogens Laboratory</i>	Commercial Corner <i>TBA</i>
8:30 am – 8:50 am	Commercial Corner <i>Myron L® Company</i>	Commercial Corner <i>Lumin Ultra Technologies Ltd.</i>
9:00 am – 10:30 am	Education Committee Workshop Biological Testing of Water: Tests, Criteria, Interpretation Moderator: R. Trace Blackmore, CWT, LEED AP, <i>Blackmore Enterprises, Inc.</i> Bruce T. Ketrick Sr., CWT, <i>Guardian CSC</i> Jim Lukanich, CWT, <i>U.S. Water Services, Inc.</i>	
9:00 am – 9:45 am	Exhibitor Meeting	
9:45 am – 10:00 am	Refreshment Break	
10:00 am – 2:00 pm	Exhibit Hall Open (<i>Complimentary Lunch</i>)	
11:00 am – Noon	Owners' Roundtable* <i>*This session is for current and future business owners only.</i>	
1:00 pm – 2:00 pm	Learning Lounge Open Facilitator: John Zibrida 1:00 pm – 1:30 pm: Best Practices: Aluminum Boiler Guidelines Facilitators: Keith Johnson, Ken Sansom, CWT 1:30 pm – 2:00 pm: Best Practices: Cooling Water Do's and Don'ts	
2:00 pm – 7:00 pm	Exhibit Hall Teardown	

2:00 pm – 4:00 pm	Track I	Track II
	2:00 pm – 2:30 pm Prevention and Remediation of Closed Loops Contaminated With Ammonia Michael Coughlin <i>Weas Engineering, Inc.</i>	2:00 pm – 2:30 pm Evaluation of the Thermal Stability of Antiscalants for Aqueous Systems Angela Padilla, Ph.D. <i>Dow Chemical Company</i>
	2:30 pm – 3:00 pm Lay-Up of Steam Generators With Film-Forming Amines: Studies and Field Experiences Ryan Roach <i>BKG Water Solutions</i>	2:30 pm – 3:00 pm Deposit Control Polymers for Stressed Phosphate-Based Cooling Water Systems Libardo A. Perez, Ph.D. <i>The Lubrizol Corporation</i>
	3:00 pm – 3:30 pm High Pressure Boiler Phosphate Hideout: What Is It? Timothy P. Hone, CWT <i>Hone Engineering, Inc.</i>	3:00 pm – 3:30 pm Introduction of a Novel Terpolymer for Control of Waterside Deposition Anthony M. Rossi Richard A. Salazar <i>GE Water & Process Technologies</i>
	3:30 pm – 4:00 pm Application Roadmap for Successful Jar Testing Kevin R. Cope <i>Brenntag North America</i>	3:30 pm – 4:00 pm A New Maleic Polymer Chemistry for Improved Cost Effectivity of All-Organic Cooling Water Programs Colin Hogan, Ph.D. <i>BWA Water Additives</i>
4:00 pm – 4:15 pm	Break	
4:15 pm – 4:45 pm	Legionella Outbreak in Quebec: What Have We Learned? Jacques Murray, T.P., CWT <i>Magnus Chemicals Ltd.</i>	
4:45 pm – 5:15 pm	Rules of Three—Simplifying the Selection of Polymers and Phosphonates Mike Standish <i>Radical Polymers</i>	
6:30 pm – 10:30 pm	AWT Annual Reception and Awards Dinner at the Country Music Hall of Fame	

Continuing Education Units (CEUs)

Certified Water Technologists (CWTs) need 25 CEUs to recertify. CEUs are awarded to current CWTs for attending the AWT Annual Convention and Exposition as follows:

Full Convention Registration: 5 CEUs

One-Day Pass Registration: 1.5 CEUs per day (Thursday – Saturday)

Note: "Walk-the-Hall" and "Exhibitor Booth Staff" registrations will not qualify for CEUs.

Schedule-at-a-Glance

Saturday, September 12

7:00 am – 1:30 pm **Registration Open**

7:00 am – 8:00 am Continental Breakfast

7:00 am – 1:30 pm Speaker Ready Room Open

8:00 am – 10:00 am	Track I	Track II
8:00 am – 8:30 am The Art of Water Reuse and Optimization in a World of Diminishing Water Supply Frank Ladd <i>Aquanomix, LLC</i>	8:00 am – 8:30 am Reverse Osmosis Scale Prevention and Control With Advanced Polymer Technology Jonathan Hays <i>Tiarco Chemical</i> Kelle Zeiher <i>Garratt-Callahan</i>	
8:30 am – 9:00 am The Impact of Inhibitor Speciation on Efficacy: pH, Ionic Strength and Temperature Impact Robert J. Ferguson <i>French Creek Software, Inc.</i>	8:30 am – 9:00 am High Performance Filtration Options for Reverse Osmosis Pretreatment Jim Groose <i>Watersurplus</i>	
9:00 am – 9:30 am Leveraging International Water Monitoring Technologies to Increase Energy Efficiency Joerg-Tilman Heyl <i>Heyl Brothers North America L.P.</i>	9:00 am – 9:30 am Minimizing Water Footprint by Implementing Semi-Batch Reverse Osmosis Michael Boyd <i>Desalitech</i>	
9:30 am – 10:00 am Providing Patient Quality Water and the Need for Critical Maintenance Chris Ebener <i>LiquiTech Environmental Solutions</i>	9:30 am – 10:00 am Water Savings, Reliability, and Readiness via Decentralized Reclamation and Reuse Jonathan Lanciani <i>Sustainable Water</i>	

10:00 am – 10:15 am Refreshment Break

10:15 am – 12:15 pm	Track I	Track II
	10:15 am – 10:45 am When Is Chlorine Dioxide Really Chlorine Dioxide? Edward T. Ott Sr. <i>ProMinent Fluid Controls, Inc.</i>	10:15 am – 10:45 am Dual Biocide Application for Optimization of Microbial Control in Hydrofracture Fluids: Leveraging Biocide Strengths Cameron Campbell <i>Kemira Chemicals, Inc.</i>
	10:45 am – 11:15 am An Improved Method for Detecting and Monitoring Isothiazoline—A Commonly Used Biocide in Cooling Water and Closed Loops Richard D. Moll <i>Rochester Midland Corporation</i>	10:45 am – 11:15 am Novel Uses of Metal Precipitants Steven Buday <i>Plymouth Technology, Inc.</i>
	11:15 am – 11:45 am Lessons Learned, Field Experience With Monochloramine Frank P. Sidari III, PE, BCEE <i>Special Pathogens Laboratory</i>	11:15 am – 11:45 am Cleaning Dirty Oil/Gas Flowback, Produced and Sourced Fresh Water for Reuse-Recycling Timothy L. Drake, Ph.D. <i>Zinkan Enterprises, Inc.</i>
	11:45 am – 12:15 pm Understanding Third-Party Validations and UV System Sizing Brian Grochowski <i>Aquionics</i>	11:45 am – 12:15 pm Removing Selenium From Water by Absorption Onto Functionalized Activated Alumina Media Matthew Luebbers <i>MAR Systems, Inc.</i>

Sunday, September 13

8:00 am – 4:00 pm Board of Directors' Meeting



Thursday, September 10 *Session Descriptions*

Commercial Corner Tracks

AWT's Annual Convention will feature Commercial Corner Tracks again this year. Presented by leading vendors in the water treatment industry, these informal mini-sessions are your opportunity to learn more about the products and services offered by these companies and the positive impact they can have on your company's operations.



Thursday, September 10

7:30 am – 7:50 am	Wincom, Inc.	TBA
8:00 am – 8:20 am	BWA Water Additives	Tintometer Inc.

Friday, September 11

8:00 am – 8:20 am	Special Pathogens Laboratory	TBA
8:30 am – 8:50 am	Myron L® Company	LuminUltra Technologies Ltd.

General Session

8:30 am – 10:00 am

AWT Annual Membership Meeting – Town Hall Meeting

Be sure to attend this important meeting where you will be updated on AWT's latest projects. Make your voice heard and impact the direction of AWT!

- Call to Order
- President's Report
- New Business
- Q&A Period – Treasurer's Report
- Q&A Period – Committee Reports
- Q&A Period – Liaison Reports
- Approval of Minutes from October 30, 2014
- Adjournment

11:30 am – Noon

Music City Center's Sustainability Procedures and LEED Certification

Amanda Littleford, *Music City Center*

The Music City Center is a 1.2-million-square-foot facility. Because conservation of energy and natural resources is a high priority for the Music City Center, it made substantial efforts to minimize its carbon footprint. Having LEED® Gold certification means the building consumes, on average, 20 percent less energy and 40 percent less water than conventionally designed buildings of the same type. Amanda Littleford, the sustainability manager at Music City Center will give a presentation outlining how the facility achieved LEED® Gold certification as well as its sustainability procedures.

Keynote Session

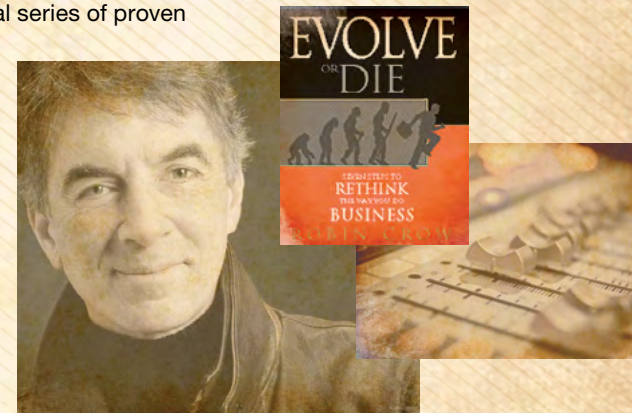
10:00 am – 11:00 am

Rock Solid Leadership

Robin Crow

Dark Horse Institute

Business growth cannot be sustained if it remains in its present form. We have already witnessed the disintegration of traditional business models from the excesses of the 1990s and early 2000s. Achieving higher levels of efficiency, excellence, and profitability has never been more challenging. In his book *Evolve or Die*, Robin clearly demonstrates how businesses and organizations must position themselves to be constant innovators able to adapt to and embrace change. In this keynote, Robin lays out a practical series of proven tools and real-world techniques to help you successfully navigate your business to long-term sustainability and greater profitability.



Thursday, September 10 *Session Descriptions*



Concurrent Sessions—**Track I** 2:00 pm – 4:00 pm

2:00 pm – 2:30 pm

Soft Skills: Communicating, Presenting, and Leading

Jack Slaby, CWT
Weas Engineering, Inc.

As a member of the educational organization Toastmasters International for more than five years, Jack Slaby will explain the process of speaking effectively to enhance our communication and leadership skills on an ongoing basis while networking with our community to improve our social skills. As we focus on our technical skills, sometimes we forget that we need to communicate in a concise and memorable style in order to teach, preach, inspire, motivate, call to act, or yes, sell. You will learn how to minimize filler words like “Ah, you know” and “etcetera” that can distract from the message. You will learn how to have an effective slide presentation. Finally, you will learn how to vary your voice and use proper gestures to impact your presentation. Hopefully, Jack’s presentation will accomplish his goals by engaging the audience to enhance their softer skills.



2:30 pm – 3:00 pm

Leveraging Limited Marketing Resources

Karen Danielson
U.S. Water Services, Inc.

In small business settings, wearing multiple hats is a necessity for many professionals, often resulting in situations where marketing has to be learned by someone or where limited time can be spent on the marketing aspect of the business itself. This presentation will focus on helping business owners prioritize and understand which key marketing tasks should be performed to leverage their business for greater success with limited time, budget, and resources.

3:00 pm – 3:30 pm

Is Your Insurance Qualified for the Job?

John Walsh
Water Color Management

Many times, water treatment business owners who are purchasing insurance think they have bought the right kind of insurance to qualify for contracts and protect themselves in the event of claims by principals. Owners often find out only when they have a claim whether are not they have the right coverage and sufficient limits to pay litigation costs. Key coverage that no water treater should be without will be defined and explained, including unlimited defense costs; broad

pollution coverage, to include mold, bacteria, and *legionella* liabilities; and per project aggregate liabilities. Participants will be taught about finer points in policy language, such as height restrictions, that may affect coverage. Additional coverage options that may be necessary depending on the nature of your business will be outlined, including completed operations and additional insured coverage.

Illustrated throughout with brief case examples, this presentation will serve as a targeted “Insurance 101” for all those who purchase insurance for water treatment businesses. The presentation aims to educate consumers so that they can be assured that their insurance dollars are being invested wisely and that they can get and stay on the job.

3:30 pm – 4:00 pm

Knowledge Management in Water Treatment

James McDonald, PE, CWT
Chem-Aqua, Inc.

In today’s information world, are we getting better or worse at “knowing” what to do when we need it? In today’s graying of the water industry as baby boomers retire, how do we pass on the knowledge from gray heads to younger heads? In today’s busy world, how do we find the time to manage the knowledge within our organizations to make them stronger, more capable companies? There is no right answer that fits all cases, but a well-rounded approach will get you closer to the target. Once you understand what knowledge is and is not and how it flows, it is easier to create an effective knowledge management program.



Concurrent Sessions—**Track II** 2:00 pm – 4:00 pm

2:00 pm – 2:30 pm

Photosynthesis—Inhibiting Biocide Solves Algae Fouling Problems in Recirculating Water Systems

Jeffrey F. Kramer, Ph.D.
BWA Water Additives

Cooling tower systems offer the ideal conditions for microbiological fouling: warm heat transfer surfaces, exposed to the open air, complete with sunlight. Algae growth can accumulate on wet cooling system surfaces, particularly during the prime cooling season, thereby impeding heat transfer, leading to increased energy consumption. Algae growth can also cause surfaces around cooling towers to be slippery, creating a safety hazard. Algae growth can also lead to problems in wastewater ponds, and cooling ponds that are utilized to remove and dissipate unwanted heat from processes. Many common industrial biocides applied do not offer adequate protection against algae, which is difficult to remove, particularly if low flow conditions exist in parts of the distribution system. One specialty algaecide, terbutylazine (TBZ), has been particularly successful at resolving algae issues in cooling towers and holding ponds due to its ability to inhibit photosynthesis. This paper will examine a field application of TBZ and the resulting impact on cooling system operations.

2:30 pm – 3:00 pm

An Improved Approach for Biofilm Control in Small to Medium Water Treatment Systems

Christine E. McInnis, Ph.D.
Dow Microbial Control

Cooling water systems may encounter a variety of problems from biofouling, including greatly reduced efficiency, blocked screens and filters, and increased levels of pathogenic organisms such as *Legionella pneumophila*. A blend of chloromethylisothiazolone and methylisothiazolone (CMIT/MIT) has been successfully used for microbial control in industrial water treatment applications for many years. CMIT/MIT is highly effective against a wide range of microorganisms, including *Legionella*, biofilm-formers, and sulfate-reducers. Although CMIT/MIT has historically been dosed into cooling systems as a liquid, a solid version has recently been developed. The new solid isothiazolone biocide is a 7% active tablet that dissolves rapidly and has improved safety and handling features. The tablet is individually wrapped in a water-soluble film, dissolves completely, leaves no residue, and has good compatibility with standard materials of construction. This new technical approach provides water treatment professionals with additional options to effectively treat small to medium systems and streamlines operations by reducing transportation, storage, and handling issues associated with liquids. The paper will describe the efficacy of biocides such as MIT/MIT against biofilm and *Legionella* as well as discuss the basic characteristics of the new solid form based on lab and field studies.

3:00 pm – 3:30 pm

Innovative and Unique Delivery System for Solid Oxidizing Biocide Provides Safer, Easier, and Faster Application Method for Microbiological Control of Cooling Water

Terry P. Goeman
King Technology, Inc.

David Guy
King Technology, Inc.

Advantages and benefits of an innovative and unique solid oxidizing biocide delivery system will be presented. Presentation content will include case study review, test data, installation diagrams, and user feedback.



3:30 pm – 4:00 pm

A Biofilm Primer: The Relationship Between Biofilm and Water System Pathogens

Diane Miskowski, MPH
EMSL Analytical Inc.

Legionella has typically received most of the attention as the water system pathogen of concern, but there are others that are equally as devastating and costly. This presentation will discuss some of the newer pathogens that have been identified through molecular testing and how/why these pathogens co-exist in biofilm. In the last few years, we have recognized that we can't control these pathogens fully until we find a way to eliminate

biofilm. This presentation will offer an overview of the mechanisms behind biofilm development, how microorganisms change from planktonic forms (free-floating) to sessile forms (attached in a biofilm), and the advantages that biofilm confers in the protection of microorganisms. In addition, the final part of the presentation will include a "thought topic" and possible call to action for reviewing how water treatment effectiveness studies are designed going forward.

Friday, September 11 *Session Descriptions*



Education Committee Workshop

9:00 am – 10:30 am

Biological Testing of Water: Tests, Criteria, Interpretation

Bruce T. Ketrick Sr., CWT
Guardian CSC

Jim C. Lukanich, CWT
U.S. Water Services, Inc.

Learn about the causation for deposit formation in water systems along with methods that could be taken to identify and prevent it. Find out what causes a certain type of deposit to form, learn how to interpret a deposit analysis, and discover what practices and chemistries could have prevented the deposit and how to remove the deposit from the system.

Owners' Roundtable*

11:00 am – Noon

The Owners' Roundtable is a small, informal group session for business owners to share their experiences with other business owners, or soon-to-be business owners. The discussions will include what has worked and not worked, what to watch out for, best practices, and other relevant topics.

**This session is for current and future business owners only.*

Concurrent Sessions—**Track I** 2:00 pm – 4:00 pm

2:00 pm – 2:30 pm

Prevention and Remediation of Closed Loops Contaminated With Ammonia

Michael Coughlin
Weas Engineering, Inc.

Borate/nitrite blends have been the mainstay of ferrous metal corrosion inhibition in closed loop systems for decades. Microbial transformations of nitrite are well known, and procedures are available to curtail and remediate their occurrence. Ironically, the much less understood phenomenon of electrolytically induced transformation of nitrite is very common yet underdiagnosed and poorly understood. Like its microbial counterpart, electrolytically induced transformations will render a closed loop inadequately protected from corrosion. The mechanism, diagnosis, prevention, and remediation of electrolytically induced transformation of nitrite compositions will be discussed.

2:30 pm – 3:00 pm

Lay-Up of Steam Generators With Film-Forming Amines: Studies and Field Experiences

Ryan Roach
BKG Water Solutions

The operational regime of steam generators may demand short- or long-term shutdown, during which protective measures have to be taken to avoid damage of equipment due to corrosion. Dry lay-up is recommended for long-term shutdown periods (several months). Although generally providing good results, the procedures demand significant effort and a plant design that is not always available or acceptable to the operator.

The film-forming amine technology was applied to protect the steam generator during the summer shutdown. Once per month prior to the shutdown, the treatment of the water/steam system was switched from ammonia to Cetamine treatment, based on a combination of alkalizing and film-forming amines. The dosage station of the ammonia treatment was used, and dosage was proportional to the makeup water into the feed water line. Thereafter, the system was emptied.

3:00 pm – 3:30 pm

High-Pressure Boiler Phosphate Hideout: What Is It?

Timothy P. Hone, CWT
Hone Engineering, Inc.

This is a case history of a 1500-psi boiler that was suspected of phosphate hideout, causing drastic swings in pH and PO_4 when dispatched down to lower loads. When dispatched down in load, the boiler PO_4 would triple to 60 ppm and the pH would drop to 5. Once diagnosed, the phosphate must be removed. The phosphate is corrosive in this case, as indicted by the huge pH swings. The pH drop indicated that the phosphate scale is acidic and the Na/PO_4 ratio is low in Na. This caused acid gouging under the deposit and leads to thinning, to the point of mechanical failure. In addition, the scale is insulating the hottest boiler tubes. This will cause overheating and long-term, overheating creep failure. It is important to maintain chemistry as much as possible while cleaning up the PO_4 scale. Maintain a good oxygen scavenger feed. This should be a good metal passivator; pH control is also critical. No phosphate is fed during this period. This means you no longer have a residual "feedback" control program. You need to know the blowdown

rate to determine the chemical feedrates. The program continues until there is no more phosphate in the boiler water. Once cleaned up, the boiler must be evaluated to determine the phosphate solubility. The boiler should be continually monitored for hideout to verify that the boiler tube temperatures and other operating factors have not changed.

3:30 pm – 4:00 pm

Application Roadmap for Successful Jar Testing

Kevin R. Cope
Brenntag North America

Wastewater jar testing has often been called an "art." The Wastewater Application Roadmap is a logical method that takes the mystery out of jar testing. There are only six challenges that a skilled or beginning jar tester will face. This presentation will identify these challenges, offer a logical roadmap for understanding how each challenge fits together, explain how to resolve each challenge, and provide a method for product selection. There are numerous organic and inorganic coagulants; cationic, nonionic, and anionic flocculants; and liquid, emulsion, and powdered products available—choosing can be difficult and overwhelming for the beginner. This presentation is designed for the beginner but has also been helpful for experienced wastewater treaters. Getting the opportunity to jar test is often easy, but knowing what your customers' treatment objectives are can sometimes be overlooked in the process. We begin with a very simple question: "What are you trying to remove from your wastewater?" Knowing this will place you on the Application Roadmap.

Concurrent Sessions—**Track II** 2:00 pm – 4:00 pm

2:00 pm – 2:30 pm

Evaluation of the Thermal Stability of Antiscalants for Aqueous Systems

Angela Padilla, Ph.D.
Dow Chemical Company

Scale inhibitors play a key role in water programs for inorganic scale control. Often, various applications involving precipitation of inorganic salts also encounter high-temperature conditions; thus, it is crucial that these scale inhibitors demonstrate good thermal stability. Even if there is partial degradation under application conditions, the remaining residue of the scale inhibitors is expected to deliver appropriate performance. To study these behaviors, an effort was undertaken to study the thermal resistance of various scale-inhibiting chemistries well known in the market. The approach of this research program was to understand the behavior of incumbent chemistries under heat stress and different application conditions. Performance testing of the heat-treated products at different temperatures, as well as chemical characterization, was conducted. Such studies allowed a better characterization of the degradation pathways as well as identification of superior performing products. This investigation would also enable the selection of appropriate scale inhibitors depending on the thermal stability needs.

2:30 pm – 3:00 pm

Deposit Control Polymers for Stressed Phosphate-Based Cooling Water Systems

Libardo A. Perez, Ph.D.
The Lubrizol Corporation

Phosphate-based treatment programs are widely used for cooling water systems to prevent corrosion on low-carbon steel heat exchangers and piping. Water scarcity and environmental issues have necessitated creative water consumption approaches, including operating cooling systems at higher cycles of concentration and using treated municipal or industrial wastewater as cooling system makeup water. These water-use reduction approaches increase the potential for calcium phosphate scaling, especially when using treated wastewaters that may contain phosphate, other inorganic ionic species (e.g., iron, aluminum, sulfate), or other organic contaminants that collectively increase fouling and microbiological activity. This paper presents a technological approach for treating cooling systems operating under stressed conditions. The paper discusses treatment program efficacy for controlling metal-phosphate scale formation on cooling system surfaces over a wide range of stressed conditions and compares results to other commonly used industrial treatment programs.

3:00 pm – 3:30 pm

Introduction of a Novel Terpolymer for Control of Waterside Deposition

Anthony M. Rossi
GE Water & Process Technologies

Richard A. Salazar
GE Water & Process Technologies

Waterside scale deposits in steam boilers can have dramatic impact on fuel efficiency, boiler structural integrity, and maintenance costs for the steam plant operation. In severe cases, waterside scale accumulations can cause boiler tube failures due to overheating and restriction of effective water circulation, as well as underdeposit corrosion mechanisms. The primary measures to prevent these failures are effective makeup water pretreatment, internal chemistry control, and effective chemical treatment practices. A novel terpolymer chemistry was recently introduced for efficient and cost-effective control of waterside scale deposits in steam boilers in the low-to-intermediate pressure ranges up to 900 psig (approximately 60 barg). The initial focus of this new chemistry development was for improved control of iron oxide deposition in “all-polymer” treatment programs, as increased use of reverse osmosis pretreatment has shifted the contaminant balance toward ferrous corrosion products from traditional hardness scale species. This paper will detail both field application results of the new program in the all-polymer mode as well as profile its performance in inorganic and organic phosphate programs, which are applied widely and successfully in low-to-moderate pressure boilers.

3:30 pm – 4:00 pm

A New Maleic Polymer Chemistry for Improved Cost Effectivity of All-Organic Cooling Water Programs

Colin Hogan, Ph.D.
BWA Water Additives

Following their introduction in the 1970s, maleic homopolymers (PMAs) have provided water treaters with convenient, all-organic options for operating alkaline cooling water programs. Their stabilization of soluble calcium, coupled with crystal growth modification properties, has helped steer cooling water treatment toward safe, alkaline operation at higher cycles and operating efficiencies. The propensity for PMA to modify crystal morphology to non-adherent, easily dispersed solids permits efficient operation even after salt solubility limits are exceeded. Formulators have also discovered how PMAs can extend the calcium tolerance of phosphonic acid deposit and corrosion control agents. PMA selection for use in cooling water programs is based on specific physicochemical and environmental profiles. Performance improvement versus existing PMA polymer chemistry is revealed using dynamic scale loop, evaporative cooling water pilot rig, and mild steel coupon weight loss experiments. Additionally the deposit and corrosion control properties of all organic formulations based on NPMA in a recirculating cooling water rig is presented and compared with performance of formulations based on existing PMA chemistry. NPMA is presented as a new building block for improving the cost efficiency of all organic, alkaline cooling water programs.

General Session

4:15 pm – 4:45 pm

***Legionella* Outbreak in Quebec: What Have We Learned?**

Jacques Murray, T.P., CWT
Magnus Chemicals Ltd.

In our world of water treatment professionals, the risk associated with *Legionella* bacteria is very well documented. Development, behavior, and growth of this pathogen are explained extensively. The transmission mode and risk factors for people exposed to the bacteria are understood and supported with statistics. Prevention and testing techniques have been discussed thoroughly. Multiple good practices manuals are also available and updated regularly. What is less documented however, is the field experience of *Legionella* outbreaks. What happens when such event occurs in our area? When we are directly involved? When we are asked to give an expert answer?

4:45 pm – 5:15 pm

Rules of Three—Simplifying the Section of Polymers and Phosphonates

Mike Standish
Radical Polymers

Since the 1970s, there has been prolific development and commercialization of synthetic polymers and, to a lesser extent, phosphonates, for scale control in industrial water treatment applications. If a formulator were to consider only 50 of the polymers developed over this span and six commonly used phosphonates based on primary functionality alone, he or she would be confronted with over 15 million potential choices. Just adding a simple variable such as product dosage exacerbates

this mind-boggling figure by another order of magnitude. The further addition of other additive attributes, such as stability in the presence of oxidizers, sensitivity to hardness, or thermal stability, makes the task of selection virtually insurmountable in the absence of overriding simple rules of thumb. The aim of this presentation is to simplify and, more importantly, clarify the vast landscape of polymer and phosphonate additive selection. This is achieved by reducing the selection process to Rules of Three: Three Primary Polymer Functionalities, Three Primary Phosphonate Functionalities, and Three Primary Use Considerations. Employing these Rules of Three allows the water treatment professional to simplify the decision-making process by categorizing such scale control additives into functional buckets, eliminating additives from the selection process using simple exclusion criteria, and selecting products for specialized applications based on compositional design and performance nuances. Useful and real-world examples are presented to provide an overview of the additive selection and elimination process.

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Saturday, September 12 *Session Descriptions*

Concurrent Sessions—**Track I** 8:00 am – 10:00 am

8:00 am – 8:30 am

The Art of Water Reuse and Optimization in a World of Diminishing Water Supply

Frank Ladd
Aquanomix, LLC

Water recycling is emerging as a key strategy in competitiveness, corporate social responsibility, and compliance, as reliability engineers have had backup generators for power for years but are only now realizing that they need backup water sources. It begs the question: why aren't all industries using water reuse as a best practice? And what will the future of industrial water reuse look like 10 years from now?

The current marketplace is shifting drastically to genuinely address water consumption and sustainability. Manufacturers within that marketplace are becoming increasingly aware of that shift. Products that significantly reduce the amount of water and energy usage in evaporative cooling systems are becoming both a want and a requirement as building owners and operators recognize the value of a reduced carbon footprint for their properties. Building owners and operators, water treatment professionals, and reliability engineers understand that water chemistry control significantly impacts the preservation of critical assets and that it needs to be a part of a comprehensive asset health program to deliver higher performance. By wasting less, polluting less, reusing more, managing effectively, and becoming more efficient in all uses of water, more than 1 billion people and approximately \$17 trillion of GDP could escape exposure to risks and challenges from severe water scarcity.

8:30 am – 9:00 am

The Impact of Inhibitor Speciation on Efficacy: pH, Ionic Strength and Temperature Impact

Robert J. Ferguson
French Creek Software, Inc.

Previous papers documented the impact of pH on inhibitor form and efficacy. It was shown that the dissociated inhibitor specie is the active form for the polymers and phosphonates scale inhibitors studied. This presentation expands the inhibitors evaluated and adds the impact of ionic strength and temperature on the inhibitor speciation via the dissociation constants and pKa's. Scale inhibitor dosage inhibition studies that quantify the relative efficacy of inhibitor species are included. The test methods and their development are described along with the data evaluation methods. The paper concludes with the application of the active inhibitor specie concept to practical water treatment situations, including high versus low pH barium sulfate and calcium sulfate scale control and calcium phosphate inhibition.

9:00 am – 9:30 am

Leveraging International Monitoring Technologies to Increase Energy Efficiency

Joerg-Tilman Heyl
Heyl Brothers North America L.P.

Even minimal amounts of lime scale reduce heat transmission, which leads to the immediate effect of a decrease in heating capacity—an important factor for energy costs. The reduction of the area inside the pipes also results in higher flow resistance. For instance, a layer of lime scale of less than an inch reduces the heat transfer coefficient of plate heat exchangers or tube heat exchangers. And even a seemingly insignificant layer of lime scale of just one-hundredth of an inch can ultimately result in a significant increase in energy costs. Research has shown that better control of parameters such as water hardness, carbonate hardness, and conductivity through online water quality monitoring can save facilities thousands of dollars annually in energy and down-time costs. Water quality monitoring can also greatly increase the functional life of a boiler, allowing for significant savings on capital equipment and investment. This presentation will discuss how advances in the German water sector can be translated to the U.S. market and help identify future trends in the United States. Additionally, a detailed introduction to lime scale formation and other factors influencing energy efficiency in industrial plants, as well as the development of a water hardness online monitoring instrument, will be presented. Based on this and developments in the German market, the importance of such technology in the United States will be demonstrated.

9:30 am – 10:00 am

Providing Patient Quality Water and the Need for Critical Maintenance

Chris Ebener
LiquiTech Environmental Solutions

In light of the implications of ASHRAE 188, all facilities must have risk assessment processes in place, so adopting Critical Maintenance Programs for their water systems is a necessity. A result of the Critical Maintenance Program is the achievement of Patient Quality Water, gained through onsite, systemic treatment that protects patients from infections caused by waterborne pathogens. This presentation will highlight the need for ongoing maintenance, monitoring, and documentation of prevention efforts, regardless of the secondary disinfection technology being used at any given facility.



Saturday, September 12 *Session Descriptions*



Concurrent Sessions—**Track II** 8:00 am – 10:00 am

8:00 am – 8:30 am

Reverse Osmosis Scale Prevention and Control With Advanced Polymer Technology

Jonathan Hays
Tiarco Chemical

Kelle Zeiher
Garratt-Callahan

This session will discuss the reverse osmosis process and how specialty polymers can function to minimize or prevent scale formation on the reverse osmosis membrane.



8:30 am – 9:00 am

High-Performance Filtration Options for Reverse Osmosis Pretreatment

Jim Groose
Watersurplus

Filtration has typically been performed by filter beds consisting of filter sand or a mixture of filter sand and anthracite. In the past several years, some catalytic filter media like greensand has also been used to help with oxidation and removal of iron and manganese from feedwater to prevent membrane fouling or deposition on heat exchangers. Over the past 10 years, high-performance filter media have improved the quality of water fed to reverse osmosis systems by reducing SDI input to the membranes. This can increase the time between chemical cleaning of membranes, more effectively remove smaller particulates, and reduce the amount of iron and manganese going to a membrane system. The benefit of catalytic pyrolusite filtration media for iron and manganese removal and of the use of uniformly sized alumino-silicate media to more effectively filter smaller, 1–5 micron particles will be discussed. The result of installations and performance studies will be presented. The potential to operate the filtration equipment at higher surface loading rates to reduce the space needed for the equipment, as well as the capital costs and operating expenses of the equipment, will also be discussed.

9:00 am – 9:30 am

Minimizing Water Footprint by Implementing Semi-Batch Reverse Osmosis

Michael Boyd
Desalitech

This presentation provides a general overview of the water issues surrounding the southwestern United States and sustainable measures that can be implemented to reuse valuable wastewater resources for agriculture and indirect potable reuse applications. As the growing population of the Southwest moves inland, the need for maximizing water resources and minimizing wastewater generation is urgent. This paper focuses on a case study of a closed circuit reverse osmosis system operated by the Sanitation Districts of Los Angeles that independently documented and validated its performance. Operating reverse osmosis membranes in a semi-batch configuration rather than in a conventional once-through, plug-flow configuration can reduce wastewater generation by up to 75%, significantly reducing the overall water footprint.

9:30 am – 10:00 am

Water Savings, Reliability, and Readiness via Decentralized Reclamation and Reuse

Jonathan Lanciani
Sustainable Water

This presentation will demonstrate the many benefits of water reclamation and reuse:

- Production of a stable supply of water for a variety of water needs.
- Cost savings associated with reduced potable water intake and wastewater sent back to treatment.
- Reduced energy footprint associated with treating and distributing water and wastewater.
- Pollution prevention, as less wastewater is discharged into surface waters or as highly treated reclaimed water is used to augment degraded aquatic environments.

The WaterHub® at Emory University in Atlanta, a decentralized reuse system commencing operation in 2015, will be used as a case study demonstrating multiple economic and operational benefits of decentralized water reclamation systems. This installation demonstrates the energy focus that is common on campuses around the United States and how campuswide water management is becoming critical for establishing resilient institutions of the future. This case study will illustrate the multiple benefits of decentralized treatment, including long-term utility cost savings and pricing stability for bulk water consumers, as well as optimization of effluent water quality for specific end-users on site, which provides cost savings in the treatment design process and enhances performance of utility system operations using reclaimed water.

Saturday, September 12 *Session Descriptions*



Concurrent Sessions—**Track I** 10:15 am – 12:15 pm

10:15 am – 10:45 am

When Is Chlorine Dioxide Really Chlorine Dioxide?

Edward T. Ott Sr.

ProMinent Fluid Controls, Inc.

In today's marketplace, the demand for green technologies such as chlorine dioxide has increased. As this demand has increased, so have the number of companies that claim to manufacture systems or tablets that produce chlorine dioxide. Some of their claims are valid; however, many are not.

When you are looking at using chlorine dioxide in a process, it is advisable to understand how the dioxide is generated, used, and stored to ensure that you are really getting the chlorine dioxide you need. A close look at the technologies available on the market today is important, so that a wise decision can be made before using chlorine dioxide. Another important point when looking at using chlorine dioxide is the supplier's ability to support what it sold you. Many manufacturers sell equipment or are a catalog house, so when you have a question, they cannot answer them nor can they refer you to people who can.

10:45 am – 11:15 am

An Improved Method for Detecting and Monitoring Isothiazoline —A Commonly Used Biocide in Cooling Water and Closed Loops

Richard D. Moll

Rochester Midland Corporation

Recently, a test kit was introduced to the market that can detect isothiazolone in a range of 0–7.5 mg/L.

The kit is a five-reagent system. It contains seven bottles of reagent, a small color wheel, and two test tubes. In a blind test using four operators and four standards, we found significant variation in reporting results among the four analysts. Since it is well known that color identification and recognition of colors and shades and intensities of colors is subjective, especially among males, it is not surprising that the reported values using the color wheel in the kit varied significantly among operators. The error was especially noticeable at the low end—1.5 mg/L and 0.75 mg/L. To remove the subjectivity encountered with the color wheel, it was decided we would attempt to develop a spectrophotometric method. Using the same reagents and procedure as in the previously mentioned test kit, we identified a wavelength at which the maximum absorbance occurred. The test was re-run using the same four standards and two different spectrophotometers. Calibration curves of concentration vs. absorbance for the spectrophotometric method were compared with calibration curves of concentration vs. ppm via the color wheel. The standard linear regression formula was used to generate the calibration curves. In each case R-squared was better for the spectrophotometric method vs. the visual color comparator method. The complete details of the spectrophotometric method will be reported in the paper.

11:15 am – 11:45 am

Lessons Learned, Field Experience With Monochloramine

Frank P. Sidari III, PE BCEE

Special Pathogens Laboratory

To reduce the amplification of *Legionella* in building water systems, particularly those serving a susceptible population such as healthcare facilities, secondary disinfectants are often necessary. Four technologies that provide a residual disinfectant considered for systemic disinfection of building water systems to control *Legionella* include supplemental chlorination, chlorine dioxide, monochloramine, and copper-silver ionization. Evaluation of disinfection methods to demonstrate their efficacy should be evidenced-based and follow a four-step approach: 1) Demonstrate in vitro efficacy, 2) Apply anecdotal experience of efficacy in individual hospitals, 3) Peer-review controlled studies of prolonged duration documenting efficacy and prevention of Legionnaires' disease, and 4) Confirm reports from multiple hospitals with a prolonged duration of follow-up. No single disinfection technology is applicable to all water systems, as shown by anecdotal and published reports of underperformance or failure of disinfectants for various reasons. The successful application of a secondary disinfectant is dependent on numerous factors, including the ability to maintain a disinfectant residual, configuration of the water system, cost of consumables, operation and maintenance, source water quality, and permitting requirements. Most importantly, the selected secondary disinfectant should demonstrate efficacy for controlling

Legionella without negatively impacting the water distribution system. The presenters will use monochloramine case studies to discuss what makes for successful secondary disinfection system installations to provide additional information for facility operators to use in the evaluation of disinfection technologies.

11:45 am – 12:15 pm

Understanding Third-Party Validations and UV System Sizing

Brian Grochowski

Aquionics

Ultraviolet disinfection has gained increasing acceptance as a means of disinfecting liquids in industries such as food and beverage, pharmaceutical, aquaculture, and oil and gas. As a technology, however, it is vastly different from the standard chemical treatments that are typically used for primary disinfection. Today, architects, consultants, engineers, and end-users are faced with the challenge of selecting from the vastly different UV system configurations, lamp technology, and sizing methodologies. Further adding to the complexity is the recent introduction of third-party validations for UV disinfection systems and how they benefit public safety. The responsibility of selecting the right system has become increasingly more complex. This paper provides an overview of UV treatment technology and provides a deeper look into the various ways UV systems are sized, with particular attention to third-party validations and how they can benefit public safety.

Concurrent Sessions—**Track II** 10:15 am – 12:15 pm

10:15 am – 10:45 am

Dual Biocide Application for Optimization of Microbial Control in Hydrofracture Fluids: Leveraging Biocide Strengths

Cameron Campbell
Kemira Chemicals, Inc.

Ever since the advent of hydrofracturing technology to obtain oil and gas from the unconventional shale gas plays, biocides have been part of fracturing fluids. The specific purpose of this biocide application is to achieve microbial control within the water pumped into the production zone of the oil gas reservoir. Typical biocide treatment regimens from other industries, as well as from the oil and gas industry, were employed to achieve the necessary required microbial control. However, after numerous years of drilling and fracturing thousands of wells, these typical treatment regimens are proving to be inadequate within many systems. Inadequate biocide treatment regimens may ultimately allow uncontrolled microbial growth and activity and most importantly, biofilm formation within the pores of the rock and proppant. This loss of control over microbial activity due to these potentially inadequate biocide treatment regimens can and has led to reservoir souring, loss of conductivity, and microbial influenced corrosion, costing the oil and gas industries more than \$1 billion dollars. Data obtained in the lab and from field trials is presented that optimizes biocide treatments utilizing the same biocides as before but leverages their strengths. The overall fracturing process takes less than 20 minutes from the pond or tanks to the end point within the reservoir. Therefore, a fast-oxidizing biocide was applied upstream,

decreasing the bacterial numbers, and a preservative biocide—AMA-324 dazomet chemistry—was applied in the blender or downstream for overall reservoir control. Several biocides were evaluated both as a single treatment and within a dual treatment regime. The dual treatment regime outperformed and achieved better control over the microorganisms and associated microbial activity both in the laboratory and the field trials as compared to the single typical biocide treatment regime. This type of biocide application maximized and potentially mitigates microbial growth and activity as well as well integrity in the wells tested, while minimizing overall operational costs and potential lost production.

10:45 am – 11:15 am

Novel Uses of Metal Precipitants

Steven Buday
Plymouth

The use of sodium dimethyldithiocarbamate (DTC) and polyethyleneimine dithiocarbamate metal precipitants are well known in wastewater treatment. They can be applied in a wide range of metal removal applications; however, they have functionality in other areas of value to the water treatment professional. This presentation will cover a basic overview of the use of metal precipitants, including both the advantages and disadvantages of two carbamate-based metal precipitants. This will be followed by two novel application techniques found in industrial manufacturing wastewater treatment. One application uses sodium dimethyldithiocarbamate as an emulsion breaker. New surfactant and metal pretreatment technologies include the use of cationic surfactants. Traditionally, anionic surfactants had been utilized.

These new cationic surfactants hold organics (including regulated metals in organo-metallic compounds) in a micelle. This micelle does not respond to cationic emulsion breakers such as polyamine, DADMAC, or metal salts. An anionic salt such as DTC can be added as part of the water treatment program to disrupt these cationically bound micelles to release the contaminants in a form that is readily removed.

11:15 am – 11:45 am

Cleaning Dirty Oil/Gas Flowback, Produced and Sourced Fresh Water for Reuse-Recycling

Timothy L. Drake, Ph.D.
Zinkan Enterprises, Inc.

Fresh water is an extremely valuable commodity necessary to all life on earth. Wise use and reuse in all process industries is the most environmentally responsible conservation practice. Peracetic acid (PAA) has been applied as part of a successful flowback and well-produced water recycling program, as an alternative to fresh-source water, and to support hydraulic fracturing operations in fields where wells experienced H₂S souring and iron buildup. PAA is a liquid biocide that can be added “on-the-fly” in the hydraulic fracturing process for use with water ranging from fresh all the way up to very heavy brines. PAA is a versatile oxidizing biocide approved for decades by the U.S. Food and Drug Administration for use as a no-rinse antimicrobial agent for red meat and poultry. In addition, PAA has proved its value as a multifaceted water-management tool at hundreds of unconventional well sites in the United States. Producers operating wells in several states, including all the major U.S.

shale plays, such as the Marcellus, Utica, and Permian basin, are incorporating PAA into integrated chemical treatment programs as a biocide to control planktonic and sessile bacteria.

11:45 am – 12:15 pm

Removing Selenium From Water by Absorption Onto Functionalized Activated Alumina Media

Matthew Luebbers
MAR Systems, Inc.

Removing selenium from water is often challenging, and there are very few effective treatment options available, particularly those capable of meeting the new discharge limits. Selenate, in particular, is generally regarded as the most difficult form of selenium to remove, often attributed to its chemical similarity to the sulfate anion. Functionalized alumina-based adsorbent media presents a low total cost treatment option requiring a much smaller footprint and lower capital expense compared to other treatment technologies, such as biological systems. Due to covalent binding of the selenium species, the single-use, functionalized activated aluminas do not generate hazardous sludge or wastewater, as the spent media will pass TCLP and California's new Waste Extraction Test. These functionalized adsorbents also have a range of active sites present on the surface chemistry, allowing for simultaneous capture of other metals along with selenium, including mercury, lead, arsenic, copper, and zinc.

EXHIBITORS

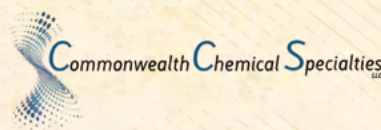
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Please refer to the Association of Water Technologies 2015 Annual Convention to obtain the group rate. Hotel reservations are on a first-come, first-served basis until August 15, 2015, or until the block has sold out. AWT cannot guarantee the group rate if rooms are still available in the AWT block after August 15, 2015.

Omni Nashville Hotel

A quick 15-minute cab ride from the airport will get you to the Omni Nashville Hotel, which is just steps from Music City Center and AWT Convention events. This luxurious, modern hotel is directly connected to the Country Music Hall of Fame, so you never even have to go outside to visit this landmark! The hotel includes a rooftop pool with stunning views of the city, a full-service space, a state-of-the-art fitness center, and three restaurants.



Air Travel

Nashville International Airport (BNA) is located about 12 minutes (8 miles) from the Omni Nashville Hotel.

UNITED United Airlines has partnered with AWT and is offering all attendees discounted airfare. When booking online at www.united.com use **Offer Code ZUCN871098**.

If you call (800) 426-1122, please remember to provide the following information:

Agreement Code: 871098

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Ground Travel

Taxi Service: \$25 each way from Nashville International Airport to the Omni Nashville Hotel.

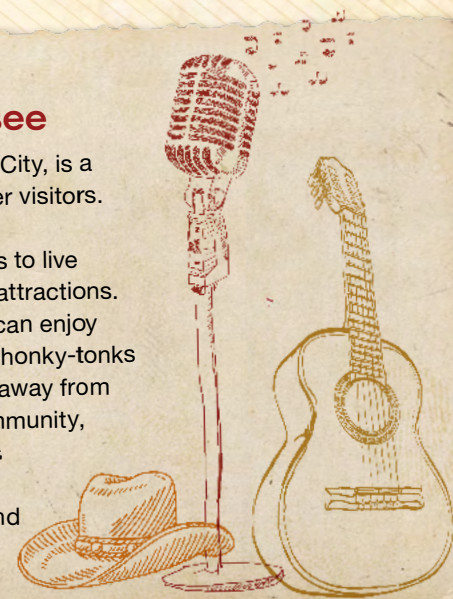
Shuttle Service: Jarmon Transportation offers convenient shuttle service between the Nashville International Airport and the Omni Nashville Hotel for only \$14/person each way. Please remember to make your reservation in advance by calling (615) 275-1714.

Attire

The dress code is business casual for the convention. Make sure to wear your cowboy boots, especially for the Awards Dinner!

Nashville, Tennessee

Nashville, also known as Music City, is a vibrant city with so much to offer visitors. Downtown Nashville is a hub of entertainment, with easy access to live music, great food, and cultural attractions. Within blocks of our hotel, you can enjoy live music at any of the famous honky-tonks on Broadway. Just a few steps away from Broadway is Nashville's art community, where you can visit world-class galleries and museums. Plus, Nashville has plenty of parks and outdoor space to explore.



REGISTRATION FORM



1 Attendee Information

☐ Member ☐ Non-Member

First Name Middle Initial

Last Name Suffix

First Name on Badge

Company

Company Address

City State Zip

Country

Telephone Fax

Email (Confirmations and meeting notices will be sent to this email address)

Emergency Contact Name and Telephone

Special Accommodations/Meals Requested

☐ Vegetarian ☐ Vegan ☐ Kosher ☐ Gluten free

☐ Other _____

2 Full Convention Registration

Full convention registration includes:

- Continental breakfast each day
- Online access to papers and presentations
- Admittance to all educational sessions
- Admittance to the Exposition Hall
- One complimentary ticket to the Annual Reception and Awards Dinner

Early Registration by 7/31/15	Member 1 st attendee	<input type="checkbox"/> \$530
	Member additional attendee	<input type="checkbox"/> \$500
	Non-Member attendee	<input type="checkbox"/> \$740
Regular Registration after 7/31/15	Member 1 st attendee	<input type="checkbox"/> \$645
	Member additional attendee	<input type="checkbox"/> \$615
	Non-Member attendee	<input type="checkbox"/> \$895

☐ **Yes, I will attend the Annual Reception and Awards Dinner Friday, September 11, 6:30 pm–10:00 pm** (box must be checked to obtain ticket)

3 Additional Tickets

Annual Reception and Awards Dinner

Full convention registration already includes one complimentary ticket to the Annual Reception and Awards Dinner, Friday, September 11.

of additional tickets _____ x \$80 /ticket = \$ _____

Name on badge for additional attendee(s)

4 One-Day Pass Registration

(A maximum of two, one-day passes may be purchased.)

One-day pass registration includes:

- Continental breakfast for that particular day
- Online access to papers and presentations
- Admittance to all educational sessions for that particular day
- Admittance to the Exposition Hall for that particular day

Member	<input type="checkbox"/> \$200	Non-Member	<input type="checkbox"/> \$300
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Please indicate day choice:

☐ Wed., Sept. 9 ☐ Thurs., Sept. 10 ☐ Fri., Sept. 11 ☐ Sat., Sept. 12

5 Spouse/Guest Registration

Spouse/guest registration includes:

- Continental breakfast
- Admittance to the Exposition Hall
- Admittance to the Opening General Session
- One ticket to the Annual Reception and Awards Dinner

Early (by 7/31/15) ☐ \$150 Regular (after 7/31/15) ☐ \$195

Spouse/Guest Name

Spouse/Guest First Name on Badge

Spouse/Guest Email

Spouse/Guest Events:

☐ **Yes, I will attend the Spouse/Guest Breakfast Thursday, September 10, 7:00 am–8:30 am**

☐ **Yes, I will attend the Annual Reception and Awards Dinner Friday, September 11, 6:30 pm–10:00 pm**

6 Golf Tournament Registration

Wednesday, September 9, 2015, 6:30 am – 2:00 pm
(Deadline to register is *Friday, August 21*)

Golf registration includes:

Full buffet breakfast, golf cart, lunch on the course, and eligibility for several prizes.

Member ☐ \$150/player Non-Member ☐ \$180/player

Mulligan(s) \$20 each x _____ = \$ _____ (total)

Handicap or Average Score: _____

You must submit your handicap or average score to participate.

☐ Yes, I anticipate using the bus for transportation to the Hermitage Golf Course.

If you need to rent clubs, please contact the pro shop at (615) 847-4001. Club rentals are \$40 plus tax. To guarantee club rentals, be sure to contact the pro shop two weeks prior to the golf outing.

7 Total Payment

\$

Check enclosed (made payable to "AWT") Check #: _____

Credit Card: ☐ Visa ☐ MasterCard ☐ American Express

Card Number

Expiration Date Security Code

Signature

Questions?

Registration	Shannon Sperati ssperati@awt.org or (240) 404-6491	Fax	(301) 990-9771
Logistics/ Accommodations	Grace Jan, CAE, CMP gjan@mgmtsolutions.com or (240) 404-6479	Mail	Association of Water Technologies 9707 Key West Avenue, Suite 100 Rockville, MD 20850
Golf/Exhibits Sponsorship	Barbara Bienkowski, CEM bbienkowski@awt.org or (240) 404-6481	Online registration	http://www.awt.org/annualconvention15/
Cancellation Policy	All cancellations must be in writing and are subject to a \$50 processing fee. No refunds will be made after Friday, July 31, 2015. No exceptions.		