Annual Convention and Exposition

September 7–10, 2016 • San Diego Convention Center and Omni San Diego Hotel
San Diego, California **awt.org**/annualconvention16

We have a variety of ways you can stay connected. Don't forget to include #awtonline16 in all of your social media posts.

Six Reasons Why You Should Attend

AWT's Annual Convention and Exposition continues to grow each year. Last year, over 1,100 attendees took advantage of opportunities to increase their business connections and resources in the industrial water treatment industry.

1 The convention's congenial atmosphere allows you to share your experiences, challenges, and concerns with your peers.

2 98% of past attendees say they return to the office with practical knowledge they can implement immediately.

3 93% of past attendees say the convention increases their industry knowledge.

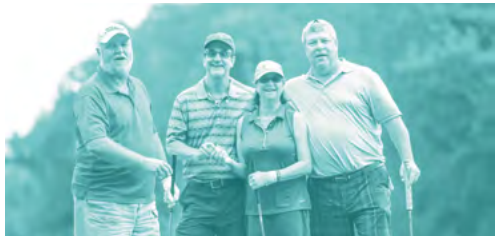
4 Since 2010, attendance has grown by more than 21%—exposing you to more individuals with whom you can network.

5 It's the only convention where you'll find exhibitors whose sole focus is industrial water treatment.

6 You'll leave the conference energized, excited, connected, and able to do your job more efficiently.

Here are a few **more reasons...**

Wednesday



Golf Tournament

6:30 am–2:00 pm

The golf tournament will be held at Maderas Golf Club, Zagat Survey's top-rated golf course in San Diego County for seven consecutive years. The course offers beauty and challenge as it winds through the cliffs, rock outcroppings, creeks, and forests of the inland hill country of north San Diego. This Johnny Miller and Robert Muir Graves designed course takes the concept of upscale golf to exhilarating levels. You won't want to miss the chance to play at this incredible location.

Carlsbad Desalination Plant Tour

9:30 am–1:00 pm

AWT has coordinated with the Claude "Bud" Lewis Carlsbad Desalination Plant to offer convention attendees a special tour. You will have the opportunity to observe the state-of-the-art process of turning salt water from the Pacific Ocean into high-quality drinking water for nearly a half a million San Diegans.

Women of Water Reception

6:30 pm–7:30 pm

Join the Women of Water (WOW) for a casual networking reception. This is your opportunity to speak with others in the industry.

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.

Personalized Benchmarking Appointments*

NEW THIS YEAR

Scott Hackworth, *CPA*
Industry Insights

Looking for ways to maximize your company's performance? Scott Hackworth, CPA, of Industry Insights, will be available for ten private 50-minute appointments to confidentially discuss your company's performance and show how you can utilize the survey results.

**Available only to those companies that participate in the AWT benchmarking survey.*

**Appointments must be made in advance and are assigned on a first-come, first-served basis. Industry Insights will contact survey participants directly to schedule appointment times.*

Friday

Annual Reception and Awards Dinner

6:30 pm–10:30 pm

This year, the Annual Reception and Awards Dinner will be held aboard the USS Midway, a U.S. Navy aircraft carrier commissioned after the end of World War II that was the largest ship in the world until 1955. In addition to learning about the carrier's history, attendees will be able to explore the more than 60 exhibits with a collection of 29 restored aircrafts. And after we celebrate our annual award winners, we'll finish the evening with our very own fireworks display!

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 in booth 531. The Portrait Lounge will be open Wednesday through Friday, located across from Chillers Bookstore Lounge.

Schedule-at-a-Glance *(as of May 10, 2016)*

Exhibit Hall
General Session
Track I
Track II

Tuesday, September 6

10:00 am–5:00 pm	Registration Open
11:00 am–5:00 pm	Exhibitor Move-In

Wednesday, September 7

6:30 am–2:00 pm	**AWT Golf Tournament—Maderas Golf Course** *Shuttle departs at 6:30 am from the Omni 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
9:30 am–1:00 pm	**Carlsbad Desalination Plant Tour** 9:30 am Meet in hotel lobby 9:45 am Buses depart hotel 10:30 am Security check-in 11:00 am Tours 12:30 pm Buses depart for hotel 1:00 pm Buses arrive at hotel
2:30 pm–4:00 pm	**Technical Subcommittee Meetings** *Boiler Subcommittee* *Cooling Subcommittee* *Pretreatment Subcommittee* *Special Projects Subcommittee* *Wastewater Subcommittee*
2:30 pm–4:00 pm	**Wastewater Recovery and Reuse Workshop** Peter S. Cartwright, P.E. *Cartwright Consulting Co.*
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**
7:00 pm–8:00 pm	**CWT and New Member Reception** (By Invitation Only)

Thursday, September 8

7:00 am–7:00 pm	Registration Open	
7:00 am–8:30 am	**Continental Breakfast**	
7:00 am–8:30 am	**Spouse/Guest Continental Breakfast**—*Welcome to San Diego Overview*	
7:30 am–7:50 am	Commercial Corner #1	Commercial Corner #2
8:00 am–8:20 am	Commercial Corner #3	Commercial Corner #4
8:00 am–5:00 pm	Speaker Ready Room Open	

8:30 am–9:00 am	**GENERAL SESSION—**Annual Membership Meeting 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 Sept. 10, 2015 Adjournment	
9:00 am–10:00 am	**KEYNOTE SESSION** **Unrivaled Trust and the Tenets of Leadership Lessons From the Modern Battlefield** George Severence Introduction, Keynote Sponsor: Robert J. Ferguson *French Creek Software, Inc.*	
10:00 am–11:00 am	**GENERAL SESSION** **Legionnaires' Disease: 40 Years Later** Claressa Lucas, Ph.D. *Centers for Disease Control*	
11:00 am–2:00 pm	**Exhibit Hall Open** (Complimentary Lunch)	
11:00 am–12:30 pm	**Technical Learning Lounge Open**	
	11:00 am–11:45 am **Technical Topic 1**	
	11:45 am–12:30 pm **Technical Topic 2**	
12:30 pm–2:00 pm	Past Presidents' Luncheon	
2:00 pm–4:00 pm	**Exhibit Hall Open** (By Appointment Only)	
2:00 pm–4:00 pm	**Track I**	**Track II**
2:00 pm–2:30 pm	**Contract Language to Protect You** Donald L. Cleveland *WaterColor Management Ltd.*	**Control of Deposition Risks in High-Silica Boiler Waters: A Novel Approach Using Engineered Tannin Chemistries** Roger Gaudreault, Ph.D. *TGWT Clean Technologies Inc.*
2:30 pm–3:00 pm	**Know What You Don't Know: Overlooked Risks and Challenges Facing All Business Owners** Michael Highum, *McGowan Insurance Group* Hugh McGowan, *McGowan Insurance Group* John Shircliff, *McGowan Insurance Group* Phil Holderness, *RT Specialty* Brian Duncan, *Duncan Financial Services/ Keystone Financial Services*	**Cooling Water Biofilms: Cause-and-Effect Problems, Conventional Treatments, and Practical Experience With a Natural Treatment** Colin Frayne, CWT *Aquassurance, Inc.*
3:00 pm–3:30 pm	**Introducing New and Innovative Practices for Sustainable Water Management** Jonathan Lanciani *Sustainable Water*	**Successful "Green' Applications of Polyamine Emulsions in Industrial Water Systems** Peter E. Greenlimb, Ph.D., CWT *Chemagineering Corporation*
3:30 pm–4:00 pm	**The Internet of Things and Its Impact on the Water Treatment Industry** Michael Henk *U.S. Water Services, Inc.*	**Best Practices Application for Innovative Cooling Tower Makeup Water Alternatives** Peter G. Elliott *GE Water & Process Technologies*

4:00 pm–7:00 pm	**Exhibit Hall Open** (Complimentary Reception)
4:30 pm–5:30 pm	**Learning Lounge Open**
4:30 pm–5:00 pm	**Electronic Field Service Reports** Facilitator: James McDonald, PE, CWT *Chem-Aqua, Inc.*
5:00 pm–5:30 pm	**What Will I Learn From Attending the AWT-Offered Training Courses?** Facilitator: Mark T. Lewis, CWT *Southeastern Laboratories, Inc.*
5:15 pm–6:15 pm	**Young Professionals Happy Hour**

Friday, September 9

7:00 am–9:00 am	Continental Breakfast	
7:00 am–5:00 pm	Registration Open	
7:00 am–5:00 pm	Speaker Ready Room Open	
7:30 am–8:45 am	**Committee Breakfast Meetings** *Business Resources Committee* *Certification Committee* *Charity Task Force* *Convention Committee* *Education Committee* *Legislative/Regulatory Committee*	 *Marketing/Communications Committee* *Membership Committee* *Technical Committee* *Standards Task Force* *Young Professionals Group*
8:00 am–8:20 am	Commercial Corner #5	Commercial Corner #6
8:30 am–8:50 am	Commercial Corner #7	Commercial Corner #8
9:00 am–9:45 am	**Exhibitor Meeting**	
9:00 am–10:30 am	**Education Committee Workshop** **Biological Testing Methods for Cooling Water—Tests, Interpretation, and Reality** Bruce T. Ketrick Sr., CWT *Guardian CSC* Jim C. Lukanich, CWT *U.S. Water Services, Inc.*	
9:45 am–10:00 am	Break	
10:00 am–2:00 pm	**Exhibit Hall Open** (Complimentary Lunch)	
11:00 am–Noon	**Owner's Roundtable*** **AWT Benchmarking Industry Survey Results Revealed** Scott Hackworth, CPA *Industry Insights* **This session is for current and future business owners only.*	
12:30 pm–2:00 pm	**Technical Learning Lounge Open**	
	12:30 pm–1:15 pm **Technical Topic 1**	
	1:15 pm–2:00 pm **Technical Topic 2**	
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	**Microbiological Control in Industrial Cooling Towers** Brian Corbin *Dow Microbial Control*	**Modeling Scale Inhibitor Blends: In Search of Synergy** Robert J. Ferguson *French Creek Software, Inc.*
2:30 pm–3:00 pm	**The Use of Adenosine Triphosphate Test Methods to Evaluate Candidate Biofilm Dispersants** Frederick J. Passman, Ph.D., CMFS, FASTM, FSTLE *Biodeterioration Control Associates, Inc.*	**New Phosphorus-Free Corrosion Inhibitor Technology** Eric Ward *Rivertop Renewables*
3:00 pm–3:30 pm	**A Case Study of a Blended Nonoxidizing Biocide in Three Different Industrial Water Treatment Systems** Cecilia McGough *LANXESS Corporation*	**Novel Ultra-Low and Non-Phosphorus Cooling Water Treatment Programs to Meet Changing Environmental Discharge Limits** David N. Fulmer *Baker Hughes*
3:30 pm–4:00 pm	**Managing Microbial Influenced Problems in the Petroleum Industry by Understanding Biocide Functionality: Type, Application, and Limitation** Cameron Campbell *Kemira*	**Stressed Alkaline Cooling Water System Deposit Control** Libardo A. Perez, Ph.D. *The Lubrizol Corporation*
4:00 pm–4:15 pm	Break	
4:15 pm–5:00 pm	**General Session** **Interpreting *Legionella* Test Results: Case Studies to Illustrate Key Criteria** Matthew Freije *HC Info*	
6:30 pm–10:30 pm	**AWT Annual Reception and Awards Dinner (USS Midway)** *Buses depart the lobby of the Omni Hotel at 6:15 pm.*	

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.

Saturday, September 10

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–8:30 am	**General Session** **Advances in *Legionella* Testing: Methods and Interpretation** Janet E. Stout, Ph.D. *Special Pathogens Laboratory*	
8:30 am–9:00 am	**Sampling Strategies and Test Methods for the Detection of *Legionella* in Potable Water Systems** Michael Coughlin, CWT Shivi Selvaratnam, Ph.D. *Weas Engineering, Inc.*	
9:00 am–9:30 am	**New York Cooling Tower Regulations: Are They Enough to Prevent Cases of Legionnaires' Disease?** Diane Miskowski, MPH *EMSL Analytical Inc.*	
9:30 am–9:45 am	Refreshment Break	
9:45 am–11:45 am	**Track I**	**Track II**
9:45 am–10:15 am	**Beyond Laboratory Research on White Rust and Passivation** Chris Nagle *Evapco*	**Bacteria Enumeration: Field Data and Comparison of Testing Methods** Amanda Meitz *Biosolutions, LLC* Walter Tyler, CWT *Arthur Freedman Associates, Inc.*
10:15 am–10:45 am	**Understanding Options for Your Analytical Sensors** Lori McPherson *Walchem, IWAKI America, Inc.*	**Challenges in Cooling Water Systems and How to Solve Them—An International Perspective** Joerg-Tilman Heyl *Heyl Brothers North America L.P.*
10:45 am–11:15 am	**Optimizing a Boiler Makeup System Using Closed Circuit Reverse Osmosis for the Lowest Cost of Ownership** Michael Boyd *Desalitech*	**Chlorine Dioxide for Control and Prevention of Biofilm and *Legionella*** Tom McWhorter *CDG Environmental, LLC*
11:15 am–11:45 am	**Recent Advances in Filming Corrosion Inhibitor Technology for Steam Boilers** Richard C. Kritchen Richard Salazar *GE Water & Process Technologies*	**Combining Onsite Rapid Testing and Connectivity Through a Smartphone Reader Application for Better Management of *Legionella* Risk** Graham R. Tyrie *Albagaia Ltd.*
11:45 am–Noon	Refreshment Break	
Noon–1:00 pm	**Track I**	**Track II**
Noon–12:30 pm	**The Treatment of Spent Metal Working Fluids** Kevin R. Cope *Brenntag North America*	**Extending Performance: A New Product for Treatment in "No Man's Land"** Mike Standish *Radical Polymers*
12:30 pm–1:00 pm	**Managing Chemistry to Mitigate Flow-Accelerated Corrosion** Randy Turner *Swan Analytical USA*	**Improved Clarification Process in Cooling Water Treatment by Efficient Polymer Mixing** Yong Kim, Ph.D. *UGSI Solutions, Inc.*

Sunday, September 11

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

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 8

7:30 am–7:50 am	**AkzoNobel Surface Chemistry**	**Peabody Engineering and Supply, Inc.**
8:00 am–8:20 am	**Qualichem**	**Mycometer**

Friday, September 9

8:00 am–8:20 am	**BWA Water Additives**	**TBD**
8:30 am–8:50 am	**LuminUltra**	**TBD**

Session Descriptions

awt.org/annualconvention16

Wednesday, September 8

Workshop

2:30 pm–4:00 pm

Wastewater Recovery and Reuse Workshop

Peter S. Cartwright, P.E.
Cartwright Consulting Co.

Although the total quantity of water on this planet has remained relatively constant for millions of years, the increasing population continues to degrade the quality of our water and impact the availability of water of acceptable quality for certain uses. One of the key approaches to obtaining water of sufficient quality is employing wastewater recovery and reuse: collecting wastewater from one application, treating it, and reusing it. Rainwater, graywater, seawater, and industrial and municipal wastewater all represent sources for reuse. This workshop identifies sources of wastewater supplies and describes appropriate treatment strategies required to meet the quality requirements for specific applications. Technologies, as well as system design, installation, and operation are detailed. Several case histories are described. The workshop also addresses such applications as the treatment of municipal sewage to generate potable water ("direct potable reuse").

Thursday, September 8

General Session

8:30 am–9:00 am

AWT Annual Membership Meeting

- 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 September 10, 2015
- Adjournment

Keynote Sessions

9:00 am–10:00 am

Unrivaled Trust and the Tenets of Leadership: Lessons From the Modern Battlefield

George Severence
Retired U.S. Navy SEAL

George Severence will present on "Unrivaled Trust and the Tenets of Leadership: Lessons From the Modern Battlefield." From his earliest days, George dreamed of becoming a Navy SEAL, and after graduating from Arizona State University, he enlisted in the Navy to pursue his goal, graduating with BUD/S Class 213 and beginning a journey that would take him to the front lines of the War on Terror. Since September 11, 2001, he has led special operations teams on four continents as a team leader, platoon commander, troop commander, task unit commander, operations officer, and executive officer, deploying seven times and working with people from 20 different countries. Over his 19 years in Naval Special Warfare, he has risen from an enlisted SEAL specializing in communications and intelligence, to a junior officer leading assault and sniper teams in Iraq and Afghanistan, to a platoon commander practicing counterinsurgency in the southern Philippines, to a commander of a Special Operations Task Unit in the most Iranian-influenced section of southern Iraq throughout the tumultuous drawdown of U.S. forces. George recently completed his executive officer tour at Special Boat Team 12.

10:00 am – 11:00 am

Legionnaires' Disease: 40 Years Later

Claressa Lucas, Ph.D.
Centers for Disease Control

In 1976, a new deadly disease struck the American Legion convention in Philadelphia. Forty years later, "Legionnaires' disease" continues to make headlines with large outbreaks, killing hundreds and sickening thousands more. In this session, learn how public health authorities detect and respond to outbreaks, as well as best practices for prevention. The speaker will describe the lessons learned from outbreak investigations and how this knowledge has been used to craft recent recommendations and regulations. Case studies will be presented to demonstrate common deficiencies in water system management and the responses needed to prevent disease associated with building water systems.

Thursday, September 8

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

2:00 pm–2:30 pm

Contract Language to Protect You

Donald L. Cleveland
WaterColor Management Ltd.

Doing business through written agreements is crucial for those in the water treatment and water handling business. The wording of such agreements is a key line of defense in mitigating liability exposure. This presentation will identify several areas of exposure for those whose core business is treating cooling towers or boilers, and will discuss how model contract language can address them. Now, with increased demands and more regulation related to the control and prevention of Legionnaires' disease, performance demands on water treaters will increase. While the fundamentals of treatment will remain the same, the tendency for finger pointing and passing on liability will be intensified. Careful written service agreements are vital, not only with customers, but also with other important entities on which water treaters rely, such as outside labs, mixers and blenders, chemical feed equipment and raw material suppliers, and equipment installers. This presentation will provide key contract language that can address such situations and protect water treaters from unintended liability. It will include model language that can be used as a starting point and adapted to the specific needs of individual businesses. It will also provide other guidance on mitigating such risks, including how to document contracted work and maintain accurate service records. Case examples will be provided to illustrate these points.

2:30 pm–3:00 pm

Know What You Don't Know: Overlooked Risks and Challenges Facing All Business Owners

Michael Highum, Hugh McGowan, and John Shircliff
McGowan Insurance Group

Phil Holderness
RT Specialty

Brian Duncan
Duncan Financial Services/Keystone Financial Services

Business owners and operators must understand and apply a significant amount of information in today's changing business environment. This list is growing and includes such things as human resource matters and compliance, addressing liabilities related to the sponsoring of health and benefit plans, and establishing a strategy to manage the growing professional liabilities associated with mounting standards and regulations. While the relevance and impact can vary greatly from one business to another, the importance of everyone having a working knowledge of these business risks is critically important. Moreover, developing and implementing certain strategies will not only offer peace of mind but also provide a road map to ensure the necessary plans are in place to mitigate any impact to the business and its employees. This presentation is designed to touch on these and other very pertinent risk factors facing AWT members. Our discipline-focused experts will offer a broad overview of some of the most pressing exposures to risk. The discussion will be very timely and offer some practical solutions or strategies for attendees to implement within their own organizations. Those attending will also be invited to ask questions, as the seminar will be an open roundtable format. In addition to the above, other specific topics to be addressed will include business continuity, cyber and network security, management liability, and the Affordable Care Act and the continuing rollout of key provisions of the law.

3:00 pm–3:30 pm

Introducing New and Innovative Practices for Sustainable Water Management

Jonathan Lanciani
Sustainable Water

This case study will demonstrate how members within AWT have brought innovative, decentralized, onsite water reclamation and reuse strategies to their clients to improve water treatment quality and optimize critical utility infrastructure efficiency. Important benchmarks that are necessary for implementing a mutually beneficial water reclamation and reuse program will be highlighted. The case study will demonstrate how aligning services with the needs of clients—through sustainable water initiatives, sustainable product lines, or other sustainable solutions—can help water industry professionals bring greater value to the customers they serve. The presenters will demonstrate how to assess their clients' value on water efficiency, resilience, and water "IQ" in order to pair them with potential partners to help elevate their operations and institute onsite water reclamation and reuse strategies.

3:30 pm–4:00 pm

The Internet of Things and Its Impact on the Water Treatment Industry

Michael Henk
U.S. Water Services, Inc.

In 2014, the number of connected devices to the internet surpassed the number of humans in the world at 7.4 billion. Communications industry leaders estimate that some 30–50 billion devices will be connected to the "Internet of Things" by 2020. With the latest explosive growth in the communications world of connected devices, it is important that water treaters understand how the changes can impact their business. Water treaters have been leveraging communications technologies for decades to stay close to their customers and the systems they treat, so what needs to change? This presentation will discuss the strategies water treatment companies should consider for leveraging the changing communications landscape. A general overview of the communications industry as it applies to water treatment will be provided, along with a review of the "Industrial Internet of Things."

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

2:00 pm–2:30 pm

Control of Deposition Risks in High-Silica Boiler Waters: A Novel Approach Using Engineered Tannin Chemistry

Roger Gaudreault, Ph.D.
TGWT Clean Technologies Inc.

The use of water sources having a high silica concentration has proven to be a major challenge for the operation of steam boilers. Despite advances in conventional technologies, high silica boiler water (>150 mg/L) continues to have a major impact on the operation and efficiency of boilers, mainly due to silica-based deposit that reduces heat transfer. This paper will report the effect of colloidal silica concentration and pH on tannin stability, using photometric dispersion analyzer (PDA) and dynamic light scattering (DLS). Using engineered tannins, case studies are reported on cleanliness and the removal of deposits for boilers with pressure lower than 300 psig, at silica levels well above any established industry guidelines. This work provides a new model on how to control the deposition risks in high-silica boiler waters for steam generators.

2:30 pm–3:00 pm

Cooling Water Biofilms: Cause-and-Effect Problems, Conventional Treatments, and Practical Experience With a Natural Treatment

Colin Frayne, CWT
Aquassurance, Inc.

Effective control of cooling water biofilms requires vigilance from service providers, as cause-and-effect biofilm problems can quickly result in amplification of *Legionella* sp., MIC, asset damage, and occasional lawsuits; yet, most new construction specs are primarily focused on cost and often fail to anticipate the reality of downstream biofilm problems (as do some big city oversight consultants!). Available biofilm monitoring methods are limited, the equipment is often expensive, and use of simple bleach or alternative biocide at inadequate concentrations can easily make matters worse. This presentation reviews problems commonly associated with cooling water biofilms, examines some traditional/nontraditional and novel potential solution options, and reports on recent European experience with a natural treatment solution that may have practical application in the United States.

3:00 pm–3:30 pm

Successful "Green" Applications of Polyamine Emulsions in Industrial Water Systems

Peter E. Greenlimb, Ph.D., CWT
Chemagineering Corporation

In 2006, ODYSSEE Environnment was founded to develop and market innovative polyamine emulsion technologies for the prevention of corrosion, scale, and deposition in industrial steam boiler, closed recirculating cooling water, and open evaporative cooling tower systems. A broad range of product formulations was developed and successfully evaluated in field studies under typical industrial water treatment conditions. This presentation summarizes ODYSSEE Environnement's experiences over the past nine years in developing and successfully applying ODYSSEE Environnement industrial water treatments as alternative, viable, and economically efficient water management approaches. Several documented case studies and program control procedures will be illustrated. Emphasis on the "Green Technology" of this unique water treatment approach, its improved heat transfer and energy efficiencies, and its simplicity in applying and monitoring polyamine emulsion water management programs will be discussed.

3:30 pm–4:00 pm

Best Practices Application for Innovative Cooling Tower Makeup Water Alternatives

Peter G. Elliott
GE Water & Process Technologies

Demand for water across the United States and the world is ever increasing, while the supply of traditional high-quality, municipally treated potable water has been keenly challenged in the face of increased population and larger industrial cooling and process water requirements. In recent years, many innovative concepts have been introduced to help mitigate increasing water usage. This presentation will focus primarily on the evaluation and practical application of four major alternative source options for makeup water to open evaporative recirculating cooling systems (cooling towers/evaporative condensers). The four makeup water options to be evaluated are 1) reverse osmosis permeate, 2) sodium zeolite softened water, 3) municipally treated wastewater, and 4) high-phosphate/grey water.

Friday, September 9

Education Committee Workshop

9:00 am–10:30 am

Biological Testing of Water: Tests, Interpretation, Reality

Bruce T. Ketrick Sr., CWT
Guardian CSC
Jim C. Lukanich, CWT
U.S. Water Services, Inc.

This workshop is an educational presentation designed to explain what biological test methods are available for monitoring biological activity in water. These test methods are then reviewed so that the actual methodology, application, and proper interpretation of the test method results may be more fully understood.

Owner's Roundtable*

11:00 am–Noon

AWT Benchmarking Industry Survey Results Revealed

Scott Hackworth, CPA
Industry Insights

Earlier this year, AWT conducted an industry benchmarking study, coordinated by Industry Insights. Scott Hackworth, CPA, vice president of Industry Insights, will present on the findings of the study and explain how to obtain the maximum benefit from the survey. This presentation will show how the information can be used to your advantage without needing to be a financial or statistical expert or requiring a substantial amount of analysis time. In addition, Scott will be available for ten 50-minute private one-on-one discussions to confidentially discuss a company's performance and how they can understand and utilize the survey results.

**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

Microbiological Control in Industrial Cooling Towers

Brian Corbin
Dow Microbial Control

Industrial water treatment programs often employ nonoxidizing biocides in conjunction with a standard oxidant to ensure a broad-based approach to microbial control. In this report, we discuss a dual biocide program and why it is considered the best defense against microorganisms in cooling towers. The overall efficacy of nonoxidizing biocides against bacteria, algae, fungi, and biofilms will be presented. Synergy between oxidizing and nonoxidizing biocides will also be discussed and treatment recommendations given. This session will also address the safety and handling of nonoxidizing biocides.

2:30 pm–3:00 pm

The Use of Adenosine Triphosphate Test Methods to Evaluate Candidate Biofilm Dispersants

Frederick J. Passman, Ph.D., CMFS, FASTM, FSTLE
Biodeterioration Control Associates, Inc.

This session reports on the use of ASTM D4012 and a surface swab adenosine triphosphate (ATP) to monitor and evaluate the efficacy of five candidate biofilm dispersant formulations. Heavy (>3 Log pg tATP/cm^2) biofilm biomass was detected on the internal surface of PVC piping at Stage 13 of a multi-stage electrocoating system. A variety of chemical agents for removing the biofilm had been tried without success. Laboratory tests were run to evaluate candidate formulations on sections of biofilm-coated PVC piping from the electrocoating system. Performance was evaluated based on D[tATP] (biofilm biomass), D[cATP] biomass in system fluid, and total suspended solids. The most promising formulation based on lab tests was evaluated in the infected system. The treatment reduced biofilm [tATP] by >3Log pg/cm^2. Proportional cATP concentration increases in the fluid confirmed that the dispersant was not biocidal.

3:00 pm–3:30 pm

A Case Study of a Blended Nonoxidizing Biocide in Three Different Industrial Water Treatment Systems

Cecilia McGough
LANXESS Corporation

This presentation will include a background of water treatment, an overview of the microbial control issues attributed to the conditions in industrial water treatment systems, the impact microbial contamination has on the operation of a water system, the common microorganisms that are developed within water treatments, and an assessment of the contribution to the microbial contamination within the unit of the different microorganisms. The presentation will also touch on the following types of water systems: recirculating cooling towers, air washers, and closed systems, focusing on the recirculating cooling tower and air washers. The treatments used in each of these water systems to control the microorganisms and a review of how biocides have played a role in water treatment systems will be covered. Historical biocide programs will be summarized based on the pros and cons of each of the biocide programs, including the difference between oxidizing and nonoxidizing biocides. The presentation will also comment on the newer restrictions in Europe directed at sensitizer chemicals, leading to further restriction on the use of chemistries like isothiazolinones and glutaraldehyde. The presentation will focus on the results of three plant trials and reviews the lessons learned from introducing the blend of bronopol and DGH to each plant trial system to optimize the microbial control—providing benefits of a blended biocide approach both from reduction in cost and performance points of view.

3:30 pm–4:00 pm

Managing Microbial Influenced Problems in the Petroleum Industry by Understanding Biocide Functionality: Type, Application, and Limitation

Cameron Campbell
Kemira

The use and reuse of water in the oil and gas industry are critical components to achieving optimal production of oil and gas. Due to the rapid movement of water, however, bacterial contamination is often overlooked or improperly treated by biocide chemistries, as the focus of these waters is solids and volume. Unfortunately, because of these oversights, many wells, reservoirs, production systems, and/or pipelines are significantly contaminated and typically will experience prolific, microbiologically influenced problems, such as reservoir souring, loss of conductivity, and microbial influenced corrosion. Many of these microbiological problems that the petroleum industry now faces could have been prevented or mitigated more effectively if there was a simple understanding of biocide functionality: type, application, and limitations. Most importantly, this knowledge, coupled with growing regulatory restrictions, which greatly impact chemical availability, makes biocide application crucial to maximizing asset integrity and minimizing operating costs. Understanding this biocide functionality further can bridge many industries that utilize biocides as the most dominant form of microbiological control or mitigation. Here we present data from the lab to the field demonstrating that this simple understanding of biocide functionality can have profound effects on mitigating microbiological influenced problems in a variety of petroleum systems. Ultimately, a more effective microbial control strategy will impact operating costs while reducing the technical challenges of microbial control in process waters.

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

2:00 pm–2:30 pm

Modeling Scale Inhibitor Blends: In Search of Synergy

Robert J. Ferguson
French Creek Software, Inc.

Existing models for calculating the minimum effective dosage for scale control have been applied to industrial and oil field scale control treatment optimization since the 1970s. Standard correlations are routinely used in developing the models. The models typically apply to a single inhibitor. Studies have been conducted to determine the impact of blending inhibitors on the minimum effective dosage, and models the blends based on synergism, competitive inhibition, and equivalent efficacy. Test methods, data, and correlations are presented and discussed with respect to mechanisms.

2:30 pm–3:00 pm

New Phosphorus-Free Corrosion Inhibitor Technology

Eric Ward
Rivertop Renewables

When chromates were banned as corrosion inhibitors for industrial cooling towers, the industry turned to phosphorus-based chemistries to replace them. Unfortunately, these chemistries came with a multitude of problems, such as fouling concerns with soluble calcium, the need for additional chemistries to stabilize phosphate, a film that is slower to form and not as tenacious as chromate, and the addition of nutrients that promote bacterial growth. Now, phosphorus-based chemistries are increasingly facing both local and federal regulations to control the contamination of surface water, which is making process water more difficult and costly to discharge to municipalities or the environment. This presentation discusses a new corrosion inhibitor chemistry that provides a replacement for phosphorus-based inhibitors and all the problems and looming regulations with which they are associated. This new inhibitor forms a more durable and passive film on steel surfaces and does not pose a fouling concern with calcium. Furthermore, the new inhibitor chemistry brings more sustainable, environmentally friendly, and flexible formulation component alternatives to the water treatment industry. To demonstrate the inhibitor's performance characteristics and benefits, electrochemical techniques are presented. Additional laboratory test methods and pilot tests are included that further demonstrate the overall effectiveness and value of this new corrosion inhibitor chemistry.

3:00 pm–3:30 pm

Novel Ultra-Low and Non-Phosphorus Cooling Water Treatment Programs to Meet Changing Environmental Discharge Limits

David N. Fulmer
Baker Hughes

Most cooling tower treatment programs utilize orthophosphate, polyphosphates, or other phosphorus-containing water treatment programs to mitigate corrosion. The most commonly used calcium carbonate scale inhibitors also contain phosphorus; however, the use of these corrosion and scale inhibitors is the object of federal and local regulations because of phosphorus contamination of surface water. States with some type of discharge limits for phosphorus have more than tripled since 1998. Therefore, there is a need for ultra-low and non-phosphorus treatment programs to meet these new discharge limits. This presentation details the technological development of these cooling-water treatment programs and will discuss results

of extensive testing of the new ultra-low and non-phosphorus water treatment programs. It will also present the data from benchtop testing, dynamic-loop testing, and pilot cooling-tower testing as well as a field trial case history. The testing showed that the ultra-low and non-phosphorus cooling water-treatment programs work in a wide range of water conditions. These programs performed equivalent to and in many cases better than traditional phosphate programs.

3:30 pm–4:00 pm

Stressed Alkaline Cooling Water System Deposit Control

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

Reasons for using alkaline CWT programs include acid feed pH control elimination, reducing system corrosion, and feedwater quantity and/or quality limitations; however, the combination of inorganic and/or organic phosphorus (in the feedwater or CWT components) and high calcium levels in cooling system recirculation waters creates operating challenges, including mixed scale formation. This presentation examines alternative treatment programs, components, and performance for cooling water systems operating under stressed alkaline conditions.

General Session

4:15 pm–5:00 pm

Interpreting *Legionella* Test Results: Case Studies to Illustrate Key Criteria

Matthew Freije
HC Info

Legionella test results can provide useful data for managing plumbing systems and validating a water management plan—but only if the data are reliable and interpreted correctly. By reviewing case studies for various building types, the presenter will illustrate how *Legionella* test results, if properly interpreted, can provide valuable information for reducing risk and managing water systems better. He will also explain crucial mistakes commonly made in interpreting the same set of results based on too few criteria.

Saturday, September 10

General Session
8:00 am–9:30 am

8:00 am – 8:30 am

Advances in *Legionella* Testing: Methods and Interpretation

Janet E. Stout, Ph.D.
Special Pathogens Laboratory

New requirements for *Legionella* risk assessments for cooling towers and building water systems and new state *Legionella* testing regulations have some water treatment professionals testing for *Legionella* for the first time. This raises many questions—from proper sample collection to interpretation of results. The effects of sample collection methods and transport and test methods on *Legionella* test results will be discussed—demonstrating how method variation between laboratories impacts results. A case study will be presented demonstrating the limitations of CDC ELITE certification. While standard *Legionella* culture methods remain the gold standard for *Legionella* detection, advances in molecular and metagenomic test methods provide new and different information. These molecular methods, along with standard culture, were used to assess seven building water systems for *Legionella* colonization. Five of seven buildings tested positive for *L. pneumophila.* Culture and polymerase chain reaction (PCR) gave concordant results for detection of *Legionella* sero-group in 93% of samples (77/83). Low-level positivity by culture (< 10 CFU/mL) was not detected by PCR for six samples. The microbiome study showed changes in microbial diversity and abundance depending on sample location (incoming cold vs. outlets). The results of this comparative analysis highlight the benefits and limitations of each methodology. In addition to the study data, helpful hints on best practices for testing and interpretation of results will be presented.

8:30 am–9:00 am

Sampling Strategies and Test Methods for the Detection of *Legionella* in Potable Water Systems

Michael Coughlin, CWT
Shivi Selvaratnam, Ph.D.
Weas Engineering, Inc.

The adoption of ASHRAE 188 has resulted in the need to validate Water Management Programs (WMP) by testing the potable water for the presence of *Legionella.* Professional and government organizations such as the American Industrial Hygiene Association, the CDC, and OSHA provide some guidance as to test frequency and actionable concentrations of *Legionella* in a WMP. Data from several studies are presented that deal with key remaining issues related to validation of a WMP and include identifying appropriate sample locations and determining the number of samples that should be tested and when Polymerase Chain Reaction (PCR) should be considered as an alternative test method to conventional culture techniques.

9:00 am–9:30 am

New York Cooling Tower Regulations: Are They Enough to Prevent Cases of Legionnaires' Disease?

Diane Miskowski, MPH
EMSL Analytical Inc.

As a result of the ongoing clusters of Legionnaires' disease (LD) that have occurred in the Bronx from winter 2014 through summer 2015, both New York State and New York City have passed groundbreaking, first-of-its kind regulations for monitoring *Legionella* and heterotrophic plate counts (HPC). This presentation will provide an overview of the regulatory action levels, explain how these regulations will not reach the goal of preventing LD clusters, and highlight the potential problems that will be encountered when HPC are tied to a regulatory action level in conjunction with monitoring *Legionella* counts.

Concurrent Sessions
Track I 9:45 am–11:45 am

9:45 am–10:15 am

Beyond Laboratory Research on White Rust and Passivation

Chris Nagle
Evapco

Chromate-based treatments for evaporative cooling applications were banned for environmental reasons more than 27 years ago. As the water treatment industry migrated from chromates to stabilized phosphate to alkaline treatment programs, the incidence of white rust corrosion has increased and was recently noted "as a serious and prevalent problem" by AWT membership.

In support of customer requests for better commissioning outcomes for new equipment commissioned with immediate heat load, Evapco initiated an in-depth study to investigate the formation and control of white rust. This study, which began over three years ago, led to the development of industry leading research equipment specifically designed to evaluate white rust formation on evaporative heat transfer surfaces. Evapco designed and built small-scale closed circuit coolers to replicate the dynamic conditions associated with evaporative cooling equipment commissioned with immediate heat load.

This presentation will review test methodologies, test data, and implied outcomes realized from more than three years of controlled testing conducted using galvanized materials of construction started with immediate heat load. In addition to proprietary research, controlled testing was performed using commercially available products marketed as either white rust inhibitors or passivation aids for evaporative cooling systems containing galvanized materials of construction. Evapco has conducted additional research focused on innovative pre-treatment technologies for the galvanized coils utilized in closed circuit coolers and evaporative condensers. The studied pre-treatment technologies are designed to minimize white rust formation across all makeup water qualities and water treatment formulations.

10:15 am–10:45 am

Understanding Options for Your Analytical Sensors

Lori McPherson
Walchem, IWAKI America, Inc.

Contacting Conductivity Sensors are the standard analytical measurement technology, but these require the ability to conduct electricity between two electrodes on the sensor. These can fail to measure if there are oils or other material present that can coat the electrode. The Electrodeless, or Torroidal, method of conductivity measurement is a preferred technology in these applications and can successfully read through a coating. The technology is more expensive but can provide better reliability in difficult applications.

This presentation will review the two technologies to enable the user to choose the best sensor for their application. pH measurement is typically done with a low-cost, replaceable, conventional electrode that utilizes a silver/silver chloride reference. This electrode technology is a good general purpose design but suffers from shorter life in many applications. A differential electrode utilizes a second glass electrode as a reference, with an inexpensive, field replaceable salt bridge/electrolyte solution. The differential electrode design has been the standard in wastewater applications but can also provide benefits to some cooling tower applications.

This presentation will review the construction of the two types of pH electrode design and discuss why the differential electrode may be a better choice in some applications. The presentation will also review the differences in sensor design and installation/maintenance requirements for the two different measurement technologies. Finally, many sensor technologies offer an option for ATC—"Automatic Temperature Compensation." This presentation will review how temperature affects the different analytical measurements (conductivity, pH, ORP, free chlorine), how the measurement is adjusted (compensated), and when you should use, or don't need, to utilize ATC.

10:45 am–11:15 am

Optimizing a Boiler Makeup System Using Closed Circuit Reverse Osmosis for the Lowest Cost of Ownership

Michael Boyd
Desalitech

A new semi-batch or closed-circuit reverse osmosis (RO) process has emerged, combining batch operation with cross flow and providing high recovery rates without excess concentration polarization. In addition, the process allows for independently adjustable flux and cross-flow and resistance to, and even reversal of, fouling and scaling. High recovery operation reduces waste concentrate/brine production and maximizes valuable water resources in drought-stressed regions, and water purification at locations where liquid waste disposal is expensive or difficult. These features are particularly beneficial for inland desalination and wastewater concentration and water reuse applications. This presentation provides a general overview of water utilization within a power generation facility, specifically focused on the ultrapure water system, which provides makeup water to the boilers and turbines. The presentation discusses system design details, pilot study results, and performance optimization information for a boiler makeup system at a peaking power plant in Southern California. A final assessment is conducted of the cost of ownership that compares semi-batch RO to traditional RO at a variety of operating points.

11:15 am–11:45 am

Recent Advances in Filming Corrosion Inhibitor Technology for Steam Boilers

Richard C. Kritchen
Richard Salazar
GE Water & Process Technologies

Surface adsorption, or filming corrosion inhibitors, have been applied for corrosion control in boiler steam-condensate systems for many years. Older technology, most notably filming amine inhibitors such as octadecylamine (ODA), find limited applicability in modern steam boilers for several reasons. First, these older materials are often difficult to feed and often require labor-intensive, manual dilution procedures. In addition, if overfed and/or subject to significant hardness or iron contamination, this older technology could form troublesome deposits on steam path equipment and in the boiler. Newer amine and non-amine surface adsorption corrosion inhibitors have addressed many of these issues and limitations. One new adsorption inhibitor class, often referred to as "polyamines," exhibits excellent volatility, system coverage and very low potential for fouling; is suitable for neat feed; and provides significant protection against both dissolved oxygen and downtime corrosion. This class of inhibitors is most frequently applied in combination with volatile neutralizing amines for optimum performance. Another newer class of surface adsorption inhibitors is designed for applications where steam contacts food, or where volatile amines are not permitted or desired, including organic food production. These inhibitors are not amine-based materials and are proving to be effective options in many applications where amines are not a viable solution. In addition to discussing the chemistry and practical application of these newer classes of surface corrosion inhibitors, performance data from several applications will be reviewed.

Concurrent Sessions
Track II 9:45 am–11:45 am

9:45 am–10:15 am

Bacteria Enumeration: Field Data and Comparison of Testing Methods

Amanda Meitz
Biosolutions, LLC
Walter Tyler, CWT
Arthur Freedman Associates, Inc.

Field tests for heterotrophic aerobic bacteria include dip slides, ATP, catalase, and some selective media methods. Nonselective bacteria media grow a variety of bacteria and include tryptic soy agar, R2A agar, and heterotrophic plate count agar. Selective media may employ media components and conditions that select for particular bacteria, such as sulfate-reducing bacteria or acid-producing bacteria. Available laboratory tests include multiple selective and nonselective media. Field data from cooling tower or closed-loop systems using more than one field test method and lab methods will be presented. Comparisons of media and explanations of enzymatic tests will be provided. Possible explanations for discrepancies between methods will be discussed.

10:15 am–10:45 am

Challenges in Cooling Water Systems and How to Solve Them—An International Perspective

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

In an open cooling system, a portion of coolant water evaporates periodically. This results in the constant increase of salt concentration in the process water. The increased salinity and mineral content of the circulating water leads to calcification and corrosion in the cooling tower and water mains. Furthermore, problems such as algae formation and dust particle outbreaks have increased the awareness of water treatment and cooling tower regulations. The two main challenges that regulations need to support are decreasing water use and increasing energy efficiency. According to the U.S. Geological Survey, most regions in the United States are affected by hard water. Shutting down for repair and maintenance because lime scale caused corrosion on the surfaces? Very expensive. How can these facilities save energy, reduce operational costs, and increase accuracy in water-related data? Automation, now called the "Internet of Things," is the key. The objective of this presentation is to give an overview of trends, challenges, and regulations for water in cooling towers in comparison to German/European regulations. The Association of German Engineers has published numerous papers and guidelines (mostly in German) that have been implemented successfully in past years. Before reinventing the wheel, we would like to summarize and compare what can be helpful for plant operators in the United States. This presentation will further explain how automated water quality monitoring devices with wireless data transfer to mobile devices will decrease operational costs and increase energy efficiency.

Concurrent Sessions
Track II 9:45 am–11:45 am

10:45 am–11:15 am

Chlorine Dioxide for Control and Prevention of Biofilm and *Legionella*

Tom McWhorter
CDG Environmental, LLC

Legionnaires' disease (legionellosis) has been described as "the most significant waterborne-disease risk associated with drinking water in the United States." *Legionella* can be killed by chlorine dioxide or other biocides; however, without control of the biofilm, *Legionella* cannot be effectively controlled as a threat to people exposed to mists or aerosols that contain protozoa from the biofilm or bits of the biofilm itself. Since it exists as a dissolved gas, chlorine dioxide has the unique ability to permeate throughout the biofilm and kill the associated organisms. Chlorine dioxide can be used to treat water systems intermittently to control, destroy, and prevent biofilm formation and therefore control the release of *Legionella* into the water. This enables a uniquely effective and economical technique for using chlorine dioxide to control *Legionella.* To treat a water system with existing biofilm, an initial application of chlorine dioxide at 10–50 ppm for one to three hours will usually destroy the existing biofilm, which can then be removed by flushing the system with clean water. After the initial flush, chlorine dioxide can be added to the system at intervals anywhere from twice per day to every other day to maintain a residual of 0.1–0.5 ppm for one to three hours at the most remote part of the system. It is essential to review the water system and eliminate any dead legs or untreated zones during disinfection treatments. Every system is different, so it is important to try an approach, measure the results, and adjust dose and duration of the treatment accordingly. Intermittent dosing with chlorine dioxide is difficult if the chlorine dioxide is supplied by a generator that requires adjustment at startup and shutdown; however, ready-to-use chlorine dioxide solutions and generator systems that require no adjustment at startup are available.

11:15 am–11:45 am

Combining Onsite Rapid Testing and Connectivity Through a Smartphone Reader Application for Better Management of *Legionella* Risk

Graham R. Tyrie
Albagaia Ltd.

The Hydrosense *Legionella* rapid field test utilizes lateral flow technology to provide presence/absence of *Legionella* antigen at a specific analytical sensitivity in 25 minutes, much like commonly known point-of-care medical tests. The test detects all 10 recognized subtypes of *L. pneumophila* serogroup 1 (LpSG1), which accounts for the majority of reported Legionnaires' disease cases. The analytical specificity and diagnostic sensitivity have been experimentally determined by independent organizations. Using filtration to concentrate the sample, the test detects LpSG1 concentrations as low as 100 cells per litre and is unaffected by other common bacteria at typical concentrations. The robustness to a range of environmental conditions and water treatment chemistries has been investigated, and the technology has been well proven for several years. Most *Legionella* control regulations insist on the importance of keeping a record of the assessment and precautionary measures and treatments related to the *Legionella* bacteria control. The computing power of smartphones has been harnessed to read the test to provide a semiquantitative result online. These results show that the smartphone reader can interpret results better than an experienced test user, and therefore, this tool can be very useful at enhancing recovery rates. Most importantly, the link provided by the smartphone connectivity through the data portal makes possible for the first time real-time data recording and, through triggered alerts, real-time water system management. The portal also records location, time, and date and provides scheduling, alerts and notifications of positive results or out of specification temperatures and biocide levels.

Concurrent Sessions
Track I Noon–1:00 pm

Noon–12:30 pm

The Treatment of Spent Metal Working Fluids

Kevin R. Cope
Brenntag North America

Oily wastewater can come from many applications: food plants, refineries, diesel repair houses, and many others. One of the most difficult types of oily wastes to resolve or "break" is spent metal working fluids. One goal of waste treatment is to reduce disposal costs. Treatment of spent metal working fluids requires the oil and water to be separated, reducing the amount of oily waste for discharge. A successful "break" of a spent metal working fluid can yield clean water, suitable for disposal at a much lower cost, and an oil layer that can be treated and possibly be reused. An early form of treatment was the Windsor Process, and it is still used today. The Windsor Process utilizes sulfuric acid, aluminum sulfate, calcium chloride, or sodium hydroxide and, in some cases, an anionic flocculent to break spent automotive metal working fluids. This process can be effective; however, as fluid manufacturers produce better products, it is becoming more difficult to break these emulsions. Any all-inorganic treatment program produces a treated oil layer containing additional solids that can cause problems with reuse or re-refining. This presentation will focus on the use of a dual cationic coagulant program. The use of two cationic coagulants can yield results far superior to the Windsor Process or any all-inorganic treatment program. Understanding the coagulant chemistries, developing the skills needed for testing, and making the test results applicable in plant operations will be presented.

12:30 pm–1:00 pm

Managing Chemistry to Mitigate Flow-Accelerated Corrosion

Randy Turner
Swan Analytical USA

Flow-accelerated corrosion (FAC) is a corrosion mechanism that increases operating and maintenance costs, impacts unit reliability, and most importantly, can be a safety concern. Cycle chemistry must be customized for each unit to address its unique design and operating issues. This requires representative sampling, accurate and reliable continuous monitoring, and meticulous control of the chemistry to minimize and hopefully mitigate FAC.

Many factors in today's environment impact unit operations and chemistry control. Requirements for increased operational flexibility call for sampling systems that can cope with start-stop or load following operation with minimal operator intervention. A shortage of qualified chemical staff leads to drastically reduced staffing levels in power plants; many sites, especially smaller units, cannot afford a chemist on all shifts. As a result, reliable online measurements and diagnostic systems become more important.

Thermal power plants using renewable fuels are on the rise. They tend to be smaller decentralized stations (e.g., biomass, waste to energy, thermo-solar units with typical capacities <100MW). Many plants struggle with the implications on the water chemistry management. As a result, water chemistry operations are neglected, and continuous monitoring is no longer assured.

In the long term, accumulated damage to the equipment and loss of generation capacity will occur. Practical examples from different power plants show good practice and typical pitfalls. References are made to the recommendations in the new VGB Guidelines (VGB R450L / VGB-S-010-2011, VGB-S-006-2012-DE), EPRI Cycle Chemistry Guidelines, and IAPWS Chemistry Guidelines for water chemistry, and for online sampling and analysis in the water steam cycle. This presentation illustrates the value of proper sampling, monitoring, and data validation to identify chemistry issues, allowing the chemist to optimize the chemistry and chemistry control.

Concurrent Sessions
Track II Noon–1:00 pm

Noon–12:30 pm

Extending Performance: A New Product for Treatment in "No Man's Land"

Mike Standish
Radical Polymers

Today's cooling water treatment approaches have been separated into three strata that are largely defined by calcium carbonate saturation of a given process water application. At one end of the spectrum are applications where low LSI waters are observed. In these applications, it is typical for a water treatment service company to have a standard "Low LSI Formula," where effective treatment is accomplished via the use of low molecular weight polyacrylates and common phosphonates such as HEDP. At the other end of the spectrum, where calcium carbonate saturation levels exceed 150X, water treatment service companies develop "High LSI Formulas," where aggressive dosages of polymaleic acids and PBTC are almost ubiquitously employed. The issue is what to do with the middle strata, or "No Man's Land," which is a quite large number of applications where neither the "Low LSI Formula" nor the "High LSI Formula" are appropriate. In such applications, polyacrylates and HEDP begin to lose efficacy due to stability loss and/or a driving force for precipitation that exceeds the functionality of the additives. Similarly, these types of waters can be inappropriate for treatment with a "High LSI Formula" containing polymaleic acid and PBTC due to mismatched functionality and/or use cost issues. In these applications, water treatment companies tend to try to either increase the dosage of the "Low LSI Formula" or modify or decrease the application of the "High LSI Formula." Risk of treatment failure is significant using either approach. A new polymer has been developed to overcome this issue of treating this significant portion of water treatment applications that fall into the middle strata. The new polymer maintains exceptional performance relative to polyacrylates in low LSI waters and provides extended stability and functionality throughout the areas where polyacrylates tend to fail. This new technology has exceptional stability with regard to hardness ions, dissolved salts, and transition metals such as iron. The polymer can extend the functionality of HEDP and is designed to be a highly effective particulate dispersant. Data presented will show the polymer to be an outstanding choice for the water treatment professional who desires to eliminate the "No Man's Land" void in their current product formulas.

12:30 pm–1:00 pm

Improved Clarification Process in Cooling Water Treatment by Efficient Polymer Mixing

Yong Kim, Ph.D.
UGSI Solutions, Inc.

To maintain the zero liquid discharge policy at cooling tower water treatment, polymeric flocculants have been used, along with other chemicals in reactor-type clarifiers. The efficiency of polymers introduced to this process strongly depends on the degree of their activation prior to being injected. This presentation illustrates how to prepare more efficient polymer solutions based on the knowledge of fluid dynamics and polymer chemistry. It includes an extensive review of papers on the relevant subject. Results of various laboratory testing are followed regarding the effect of dilution water chemistry and different mixing technologies on the effectiveness of a polymer solution. Unlike other chemicals used in water and wastewater industries, a polymer has a unique long-chain molecular structure, which requires a very different approach when designing mixing equipment. While higher molecular weight is required to achieve more efficient flocculation, it also presents technical challenges in preparing polymer solutions. The benefit of utilizing two-stage mixing—very high initial mixing energy followed by low and uniform mixing energy—is demonstrated by theoretical considerations as well as experimental data. Because it is becoming a common practice to use treated effluent from the wastewater stream for polymer mixing, the effect of residual chlorine or oxidant on polymer efficiency is also discussed.

Exhibitors *(as of May 10, 2016)*

Aceto Corporation
Advantage Controls, Inc.
Aerobiology Laboratory Associates
AkzoNobel Surface Chemistry
Albemarle Corporation
Amoeba
AMSA, Inc.
Anhui Trust Chemical Co., Ltd.
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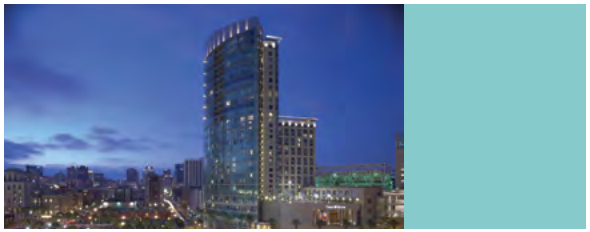
For online reservations go to: *http://awt.org/annualconvention16/location/*



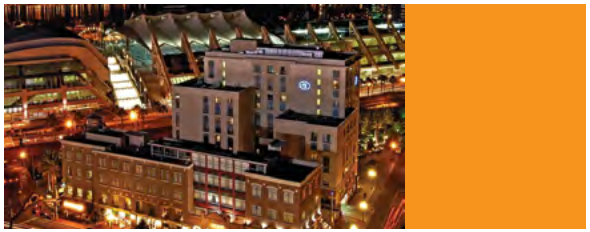
Omni San Diego Hotel (Headquarters)

675 L Street • San Diego, CA 92101
Special Group Code: 17300104810
Telephone: (800) THE-OMNI (800) 843-6664

NOTE: Due to high demand, rooms on Friday, September 9, are sold out at this time. You can put your name on a wait list with the hotel. All reservations not cancelled within seven days prior to day of arrival will be subject to a two-night cancellation fee.

Group Rate: $195 per night, single/double occupancy

Reservation Deadline: Thursday, August 11, 2016



Hilton San Diego Gaslamp Quarter

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Please remember to refer to Association of Water Technologies 2016 Annual Convention to obtain the group rate when calling your hotel. Hotel reservations are on a first-come, first-served basis until the reservations deadline, or until the block has sold out. AWT cannot guarantee the group rate if rooms are still available in the AWT block after the reservations deadline.

Air Travel

San Diego International Airport (SAN)

located about 10 minutes from the three hotels.

UNITED has partnered with AWT and is offering all attendees discounted airfare.

When booking online at www.united.com use **Offer Code ZVPX706689.**

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Agreement Code: 70668 **Z Code:** ZVPX

Weather

The temperature in San Diego in early September is typically in the mid-80s during the day and mid-60s in the evenings. Please check the local forecast before traveling.

Ground Travel

Taxi Service

$14 from the airport to the Hilton

$18 from the airport to the Omni or Marriott

Shuttle Service: Super Shuttle is available at the San Diego International Airport. Book transportation to or from the hotel online at awt.org/annualconvention16/location/travel.cfm, or you can call (800) blue-van and use code **N8SZY** to also receive a discount.

Parking

Valet parking is available at each hotel.

Hilton: $45/night

Omni and Marriott: $40/night. *Prices subject to change.*

Attire

The dress code for the convention is business casual.

San Diego, California

Who doesn't want to spend time in San Diego? The weather is spectacular year-round, with blue skies most days, and the area encompasses over 70 miles of beaches and coastline. You'll definitely want to include time before or after the convention to explore. San Diego offers every kind of activity imaginable; from world-renowned attractions and unlimited outdoor recreation to a thriving arts and culture community, sightseeing tours, and award-winning restaurants, you're sure to find a host of activities to entertain and inspire.

San Diego is a city of neighborhoods—you can visit the iconic Gaslamp Quarter and eclectic downtown community of Hillcrest, or explore the quaint and charming island town of Coronado or the picturesque village of La Jolla. Alternatively, you can spend time enjoying one of the many beaches or hiking the nearby mountains.

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 ☐ Lactose Intolerant

☐ 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 7/29/16	Member 1st attendee	☐ $530
	Member additional attendee	☐ $500
	Non-Member attendee	☐ $740
Regular Registration after 7/29/16	Member 1st attendee	☐ $645
	Member additional attendee	☐ $615
	Non-Member attendee	☐ $895

☐ **Yes** ☐ **No** I will attend the complimentary tour of the Carlsbad Desalination Plant on Wednesday, September 7, 2016 from 9:30 am–1:00 pm. *(Space is limited, first come, first served.)*

☐ **Yes** ☐ **No** I will attend the Annual Reception and Awards Dinner Friday, September 9, 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 9.

# of additional tickets_____ x $80 /ticket = $_____

Name on badge for additional attendee(s) _____

4 One-Day Pass Registration

(A maximum of 2 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	☐ $200	**Non-Member**	☐ $300

Please indicate day choice:

☐ Wed., Sept. 7 ☐ Thurs., Sept. 8 ☐ Fri., Sept. 9 ☐ Sat., Sept. 10

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 7/29/16)	☐ $150	**Regular** (after 7/29/16)	☐ $195

Spouse/Guest Name _____

Spouse/Guest First Name on Badge _____

Spouse/Guest Email *(Please provide an email address so guests can connect with one another onsite)* _____

Spouse/Guest Events:

☐ **Yes** ☐ **No** I will attend the Spouse/Guest Breakfast Thursday, September 8, 7:00 am–8:30 am

☐ **Yes** ☐ **No** I will attend the Annual Reception and Awards Dinner Friday, September 9, 6:30 pm–10:00 pm

6 Golf Tournament Registration

Wednesday, September 7, 2016, 6:30 am – 2:00 pm

(Deadline to register is Friday, August 19)

Golf registration includes:

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

Member	☐ $185/player	Non-Member	☐ $225/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 Golf Course.

If you need to rent clubs, please contact the pro shop at (858) 451-8100. 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
		Mail	Association of Water Technologies 9707 Key West Avenue, Suite 100 Rockville, MD 20850
Logistics/ Accommodations	Grace Jan, CAE, CMP gjan@mgmtsol.com or (240) 404-6479		
Golf/Exhibits Sponsorship	Barbara Bienkowski, CEM bbienkowski@awt.org or (240) 404-6481	**Register Online**	http://www.awt.org/annualconvention16/
Cancellation Policy	All cancellations must be in writing and are subject to a $50 processing fee. No refunds will be made after Friday, July 29, 2016. No exceptions.		

Association of Water Technologies
9707 Key West Avenue, Suite 100
Rockville, MD 20850