Your program committee would like to invite you and your company to the 2017 Annual Conference this year held in New Orleans, Louisiana. Along with the outstanding location we have a great program lined up for you. We have a full offering of information, education, and an opportunity to participate in some of the ongoing work on standards and codes. We believe it is our responsibility to make sure what we have to offer you can share with others at your company. Our goal is to bring you the most timely and latest information in the industry.

We have over 25 papers being presented in a concurrent format on Monday and Tuesday. Water Treating will have one session, and our Performance & Technology Group and Engineering Standards & Maintenance Group will have the other. We hope you find our attempt to add more technical papers to our program beneficial.

We will offer an extended time for committee work. In past winter meetings we had only allowed much more time to do the work so important to the CTI. Please refer to the CTI news for times and committee work to be done. In addition, please check our mobile app for the most up to date information.

The Table Top Exhibits on Tuesday from 4:00p – 8:30p will consist of 50+ top vendors from our industry to offer you a time to view the products and services they provide. There is still room for your company to put up a table for the exhibits. Contact the CTI office with your inquiries.

There will be a Panel Discussion on Monday, 2:00p – 3:45p that will cover “Legionella Regulatory Update and Root Cause Analysis: Overcoming Detection Bias to Provide Real Solutions”.

The CTI program includes an Owner/Operator Seminar (w/lunch) on Tuesday from 10:00a – 2:00p. All Owner/Operators (only) are invited. Be sure to mark it on your registration form so we’ll have a close count.

The very popular Ask The Expert session will be held Tuesday from 2:00p - 4:30p. Come prepared with your questions for the panel of experts. We will have folks from all the standing committees ready to support our questions with qualified answers.

Then on Wednesday from 8:00a - 12:00p will be the Education Program Session. Information on the program is on page 4 of this newsletter.

The CTI Program Committee has put together a program that will offer the best opportunity to inform, educate and expand your knowledge about our industry. We hope you come prepared to take full advantage of everything we have to offer you. A great location, outstanding food, entertainment, and a conference that will give back to the membership what you want… Information!

In Helen Cerra, John Lichte, Ethan Chesnut, and Pete Elliott, your program committee, invite and welcome you to the 2017 Annual Conference and meeting. I look forward to seeing you in New Orleans.

Phil Kiser, 2017 CTI Program Chairman

The CTI is ever changing with new members, new ideas, new information and certainly new issues to deal with. The BOD and many committee members are hard at work behind the scenes ensuring that the CTI continues to thrive and be the go to organization when it comes to cooling technologies, my many thanks to the continued efforts of the many dedicated volunteers! The 2017 Annual Conference is on its way and we will once again be blessed with the ability to share stories, break bread together, witness some well-crafted papers, educate and be educated ourselves and of course, collect some beads as CTI will be returning to beloved New Orleans! Join me, the CTI staff and all the members at this educational meeting and let’s embrace the educational experience for all. I recall the first time I was asked to be a panel member on “Ask the Expert,” I kept thinking why me, what do I have to offer being on this panel? I was surprised when several of the structural related questions were right up my alley! It became evident that day that each of us have our own area of expertise and through seminars like ask the expert, the educational seminars and even technical papers, we all are experts and can add to the wealth of education at the CTI! Having balanced committees within in CTI is very important, we need owner operator participation, supplier participation and manufacturer participation to get the best, most well rounded information available. Businesses and large corporations continue to have budget cuts and although to some CTI may seem like a break from the office, or a way to escape from the endeavors at work, it is a time in collectively enhance and improve all our standards, codes and guidelines. I see many individuals that are dedicated to the well-being and especially the advancement of CTI, are you one of these individuals? My challenge to you is to be this individual, the benefits of volunteering are many so join in! Involvement does not just occur at the meetings, there are many conference calls and activity outside the winter and summer meetings as well. I look back on my years at CTI, I began in 1990 and have missed a meeting yet, cooling towers are in my blood! However, we owe much to the many predecessors of CTI including all the past presidents and past CTI staff. There are so many individuals that helped create the CTI prior to me even being involved in CTI, many of which still are involved and actively participating! Product and Material Certification is the next step in the success of CTI. With certified products and certified materials, the CTI will gain similar respect certified package towers have. A true mark of excellence and a guarantee of performance for that particular product or material. Join in this endeavor and ensure that your products and your materials are certified to CTI standards. Owner Operators will be specifying these products and materials as this process blossoms so don’t be left out, rather embrace this process and help in creating the protocol and specifications necessary for this certification for each product and each material certified. It goes without saying, thanks to all the great volunteers within CTI, they make such a huge difference and help make the CTI great! Vicky and her entire staff continue to add to the greatness of CTI, they continue to do an outstanding job. If you aren’t deeply involved, then you are missing out, there is much to gain by being involved in CTI, so my challenge remains and so do my mottos: CTI: “Join in, get involved, learn, educate others, participate and thrive!”

Sincerely and respectfully,
Bill W. Howard, P.E. 2016 - 2017 CTI President

Message From The President

Sheraton New Orleans, New Orleans, Louisiana
February 5 - February 9, 2017

The Annual Conference News for Manufacturers, Owner/Operators & Suppliers of Evaporative Heat Transfer Systems
Established 1990 • Published Annually • $5/Issue

CTI, are you one of these individuals? My challenge to you is dedicated to the well-being and especially the advancement of standards, codes and guidelines. I see many individuals that aren’t deeply involved, then you are missing out, there is much to gain by being involved in CTI, so my challenge remains and so do my mottos: CTI: “Join in, get involved, learn, educate others, participate and thrive!”

Sincerely and respectfully,
Bill W. Howard, P.E. 2016 - 2017 CTI President

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Cooling Technology Institute
Annual Conference News

17

Phil Kiser
Program Chair

CTI
PO Box 681807
Houston, TX 77268

Phil Kiser
Program Chair

Phil Kiser
Program Chairman

Special Pricing for the Owner/Operators who attend the 2017 Annual Conference
See the registration (page 27) for the conference pricing.

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Message From The President

 inside
50% MORE COOLING CAPACITY THAN ANY OTHER COOLING TOWER IN THE WORLD*

NC EVEREST
the pinnacle of cooling is here

ENERGY SAVINGS
Use up to 35% less fan power* and achieve higher energy savings.

REDUCED COSTS
Reduce piping and electrical costs and realize greater installation savings because NC Everest’s innovative design minimizes piping and electrical connections.

LOW DRIFT RATE
Patent-pending Marley® Drift Eliminators achieve the lowest measurable drift rate, down to 0.00009%, of circulating water flow, so less water escapes the tower.*

CERTIFIED SOUND
NC Everest’s sound level is independently verified, per CTI 125, by a third-party, certified acoustical engineer and CTI-licensed test agent.

UNRIVALLED ACCESS
2-foot high doors and interior service decks yield unrivaled access and make inspections and maintenance easier and safer.

Take Cooling To A Higher Level – spxcooling.com/NCEverest

* Compared to other single-cell, factory-assembled cooling towers.

MARLEY®
Jeffrey Parham with Xcel Energy graduated with a B.S. in Mechanical Engineering Technology in 2003 from New Mexico State University. He started work for Xcel Energy in 2003 as plant engineer in Hobbs, New Mexico, Cunningham Station (gas fired steam unit). He then transferred to Harrington Station in Amarillo, Texas (Coal Fired unit) in 2008 as plant engineer. Jeffrey then transferred to Engineer and Construction department in 2010 as E&C engineer. Jeffrey graduated with an MBA in 2011 from West Texas A&M University. Currently he is a senior E&C engineer doing mostly capital project management.

Owner Operator Session
Tuesday, February 7, 2017 • 12:00p - 2:00p
(lunch included)

Several recent outbreaks of Legionellosis have been prematurely attributed to evaporative cooling systems. Further investigation using Root Cause Analysis often refutes these initial headlines; however, first impressions can be damaging while placing the public at risk from the true source, which is often the potable water system. Jack Bland of ChemTreat and Michaela McKenzie of DuPont will moderate a panel of Industry experts in a factual discussion of Root Cause Analysis for these recent outbreaks. The panel will address new regulations in some cities and states mandating cooling tower registration and hygiene requirements. Best practices for regulatory compliance as well as a review of the new CDC toolkit for developing building water management plans will also be offered. Please join us on Monday afternoon for this informative panel discussion!

Frank Michell is Manager of the Applications Engineering and Balance of Plant Mechanical Equipment Group of the Engineering Services Organization of American Electric Power responsible for providing engineering services to AEP's Fossil Hydro Generating Fleet in the areas of Mechanical Engineering Analysis including fluid mechanics, thermodynamics, heat transfer, stress analysis, CFD modeling and balance of plant mechanical equipment & system expertise/design basis for pumps, heat exchangers, cooling towers, HVAC & dust collection and other misc. equipment. Frank is active in several Industry Organizations including Cooling Technology Institute, EPRI and ASME. Frank is currently serving as Treasurer of the CTI Board of Directors and in 2003 served as CTI President. Frank has previously been Chairman of the ASME Power Division, Power Division Heat Exchanger Committee and is currently Chairman of the ASME 2017 Power & Energy Conference Executive Advisory Committee. Frank holds a BS Degree in Mechanical Engineering from Polytechnic Institute of New York.

Ask the Expert
Tuesday, February 7, 2017 2:00p - 4:30p

Make plans for the Ask the Expert session to be held Tuesday, February 7, 2017 starting at 2:00p and going to 4:30p. Do you have a nagging question that concerns any aspect of your cooling tower operation? Maybe you have a question concerning one of the technical papers you heard at the conference. This is the place to get those questions answered. There will be cards throughout for you to write your question down and to be given. We will have a new format this year where each question will be presented on a monitor - helping all to understand what is being asked. So prepare those cards and get them handed in so your question will be answered.

Legionella Regulatory Update and Root Cause Analysis: Overcoming Detection Bias to Provide Real Solutions
Jean-Pierre R. Libert holds a MS degree in Mechanical Engineering from Faculte Polytechnique of Mons, Belgium. He is Vice-President of Advanced Technology at Evapco in Taneytown, Maryland, where he oversees the research & development, product development, testing, rating and modeling activities of field-erected cooling towers and air-cooled steam condensers. Before joining Evapco in 2006, Jean-Pierre held technical and management positions in cooling technologies in Belgium, Mexico and the USA. Since 1985, Jean-Pierre has been an active member of the Cooling Technology Institute where he has chaired and co-chaired technical committees. Since 2014, he is an Advisor to the Electric Power Research Institute, Technology Innovation Water Use and Availability Program, Advanced Cooling. He is a member in good standing of the American Society of Mechanical Engineers (ASME). He has authored and presented technical papers on cooling systems at CTI, EPRI and ASME conferences.

Session 1: Cooling Tower System Environmental Issues and Regulatory Challenges presented by: Peter C. Carr

With over 36 years of environmental experience on fossil, nuclear and renewable power generation facilities with Bechtel Corporation, Peter Carr specializes in environmental permitting, construction environmental compliance, air pollution control and related testing. Currently, a Principal Scientist with the Bechtel Infrastructure Global Business Unit, Peter received a BS in Meteorology from Penn State and a MS in Environmental Management from the University of Maryland-University College. He is also a Certified Consulting Meteorologist (CCM) and Qualified Environmental Professional (QEP). Peter has authored numerous technical papers and served as the chair of ASME-sponsored technical committee on environmental compliance. Peter was named a Bechtel Distinguished Scientist in 2011.

Peter will discuss the environmental issues and associated regulatory challenges impacting wet and dry cooling tower systems (excluding once through systems). He will focus on construction and operational environmental impacts of wet and dry cooling systems (air quality, fogging and icing, water resources, waste, noise, etc.), primary regulatory drivers in the US (Clean Water Act Section 316b, Endangered Species, Clean Air Act, etc.), European Union, IFC/World Bank, permits and approvals (Federal, States, FAA, NPDES, etc.) and emerging environmental issues such as PM-10 and PM-2.5 drift-related emission limitations, visible plume, and water conservation.

Session 2: Economic and Performance Evaluation of Wet and Dry Cooling Technologies presented by: Andrew Cerra

Andrew Cerra is a development engineer at Burns & McDonnell, where he has worked for 8 years. He received his B.S. degree in Mechanical Engineering from the University of Missouri-Kansas City. He has experience in power plant performance optimization, and front end engineering design of combined cycle, simple cycle, cogeneration, and coal generation projects. He has worked on numerous technical papers and served as the chair of ASME-sponsored technical committee on environmental compliance. Peter was named a Bechtel Distinguished Scientist in 2011.

Andrew will discuss overall evaluation approach of cooling technology options (wet and dry, plume abatement options, ACC, Heller, parallel, etc.) in terms of overall net present value analysis (life cycle) over expected term of the plant, capital costs (two full plant project cost estimates using wet and dry cooling), water usage costs and considerations (water supply and infrastructure), other O&M costs such as non-water operation and maintenance costs, performance and associated costs using thermal performance models of plant with wet and dry cooling.

Session 3: Factory Assembled Vs. Field Erected Cooling Towers – Selection Considerations presented by: Don Dobney

Don Dobney holds a BS Degree in Mechanical Engineering from the University of Missouri in Columbia, Missouri, and an MBA from Webster University of Irvine, California. Don is President of EvapTech, Inc., Lenexa, Kansas, a wholly-owned subsidiary of Evapco. He oversees company operations including, in addition to P&L responsibility, product development, design, manufacturing, contracts, field erection and service activities serving the field-erected cooling tower market. Before joining EvapTech upon its founding in 2005, Don held project management, technical sales, and sales management positions with another leading cooling tower company followed by a brief period as a manufacturer’s representative.

Since receiving his BSME in 1985, Don has focused his career on cooling systems utilizing factory-assembled and field-erected evaporative cooling towers. As a result he fervently enjoys having direct communication and responsibility for supporting manufacturer’s representatives, design engineers, contractors, system owners, and tower operators.

Based on over 30 years of designer and end user interface, Don brings an exceptional perspective to the question of determining which type of evaporative cooling tower is appropriate for any given project. He will discuss schedule considerations (RFQ timing, submittal process, delivery and assembly, options to expedite process), system considers (water quality, load matching, redundancy, seasonal operation, site and environmental impacts, etc.), operation and maintenance considerations (routine and on-line maintenance, fan drive options, access, etc.), and comparison of relative costs (direct costs, parasitic energy costs and life cycle).

Session 4: Fundamentals of Safety for Cooling Tower Inspections presented by: Shane Taysom

Shane Taysom, CHST has over 11 years of Cooling Tower safety experience and program implementation in numerous construction and manufacturing settings and facilities. Shane graduated with a BS degree from Southern Utah University in 2004 and has over 20 years’ experience in the construction industry. Shane’s current role with SPX Cooling Technologies, is Director of EHS North America. He provides support to both the construction and manufacturing operations based out of the Overland Park, Kansas location. Working in and around cooling towers presents many inherent hazards. Cooling tower inspectors are in close proximity to rotating and electrical equipment, may be required to climb on wet/slick surfaces, and encounter potentially unsafe working platforms. The structural condition of the tower they are inspecting may be in unknown stages of deterioration, and workers can be exposed to environmental hazards. This presentation will address the importance of identifying all potential safety and health hazards associated with working in and around a cooling tower, as well as the importance of developing safe inspection general practices, and job-specific plans to eliminate or control those hazards.
Cooling Technology Institute Licensed Testing Agencies

For nearly thirty years, the Cooling Technology Institute has provided a truly independent, third party, thermal performance testing service to the cooling tower industry. In 1995, the CTI also began providing an independent, third party, drift performance testing service as well. Both these services are administered through the CTI Multi-Agency Tower Performance Test Program and provide comparisons of the actual operating performance of a specific tower installation to the design performance. By providing such information on a specific tower installation, the CTI Multi-Agency Testing Program stands in contrast to the CTI Cooling Tower Certification Program which certifies all models of a specific manufacturer’s line of cooling towers perform in accordance with their published thermal ratings.

To be licensed as a CTI Cooling Tower Performance Test Agency, the agency must pass a rigorous screening process and demonstrate a high level of technical expertise. Additionally, it must have a sufficient number of test instruments, all meeting rigid requirements for accuracy and calibration. Once licensed, the Test Agencies for both thermal and drift testing must operate in full compliance with the provisions of the CTI License Agreements and Testing Manuals which were developed by a panel of testing experts specifically for this program. Included in these requirements are strict guidelines regarding conflict of interest to insures CTI Tests are conducted in a fair, unbiased manner.

Licensed CTI Thermal Testing Agencies

<table>
<thead>
<tr>
<th>License Type</th>
<th>Agency Name</th>
<th>Contact Person</th>
<th>Website / Email</th>
<th>Telephone/Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>A,B</td>
<td>Clean Air Engineering</td>
<td>Kenneth Hennon</td>
<td><a href="http://www.cleanair.com">www.cleanair.com</a></td>
<td>865.938.7569</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:khennon@cleanair.com">khennon@cleanair.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A,B</td>
<td>Cooling Tower Technologies Pty Ltd</td>
<td>Ronald Rayner</td>
<td><a href="mailto:coolingtwttech@bigpond.com">coolingtwttech@bigpond.com</a></td>
<td>61 2 9789 5900</td>
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<td>61 2 9789 5922</td>
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<td></td>
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<td><a href="mailto:cttai@outlook.com">cttai@outlook.com</a></td>
<td></td>
<td>913.681.0039</td>
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<td></td>
<td></td>
<td></td>
<td><a href="http://www.mchale.org">www.mchale.org</a></td>
<td>425.557.8377</td>
</tr>
</tbody>
</table>

* Type A license is for the use of mercury in glass thermometers typically used for smaller towers.
Type B license is for the use of remote data acquisition devices which can accommodate multiple measurement locations required by larger towers.

Licensed CTI Drift Testing Agencies

<table>
<thead>
<tr>
<th>Agency Name</th>
<th>Contact Person</th>
<th>Telephone/Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Air Engineering</td>
<td>Kenneth Hennon</td>
<td>800.208.6162</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.cleanair.com">www.cleanair.com</a></td>
<td>865.938.7569</td>
</tr>
<tr>
<td>McHale &amp; Associates, Inc</td>
<td>Jared Medlen</td>
<td>865.588.2854</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.mchale.org">www.mchale.org</a></td>
<td>425.557.8377</td>
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CTI Thanks The Following Sponsors For Their Contributions To The Hospitality Suites For 2017

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5. Bedford Reinforced Plastics
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9. Composite Cooling Solutions, L.P.
11. Cooling Tower Technologies, LLC
12. Ecodyne Limited
13. Environmental Safety Technologies
15. Evergreen Cooling Technologies Inc.
16. F.E. Moran, Inc.
17. Fas'Tec International
18. Hamon
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Code of Ethics

We the members of the Cooling Technology Institute (CTI), when acting on behalf of CTI, its members and the industry, will always abide by:

• Behaving with honesty, trustworthiness, and in good faith in representing and performing duties for the betterment of the CTI.
• Always striving to provide the best and most up to date technological information so CTI remains current with industry standards, specifications, guidelines and recommended practices for the benefit of both our members and our industry.
• Insuring that all official works, statements and/or actions on behalf of CTI are so noted as official property of the CTI. All non-official works, statements and/or actions will be clearly recognized as not of CTI and are of personal opinion.
• Avoiding damaging or critical actions with other CTI members that might be personally hurtful or degrading to their employer.
• Exposing existing or past conflicts and rectifying these conflicts in an expedient manner to the best possible solution for all parties involved.
• Holding fellow CTI members in the highest regard of respect and admiration.

August 29, 2006
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Our goal at Brentwood is to make your job easy and provide you with the best possible service. We understand that time is money, so you need the product to be delivered both on time and in excellent condition. Our experienced customer service team will accommodate your schedule and ensure efficient delivery to your job site. With multiple manufacturing facilities and shipping locations, Brentwood is a partner you can trust to arrive on time, every time.

brentwoodindustries.com/coolingtower
I. Call to Order
II. Introduction of Attendees
III. Approval of 2016 Committee Workshop Minutes
IV. Professional Development Hours (PDH)
V. Documents Awaiting Ad-Hoc Approval
VI. Documents Awaiting Board Approval
VII. Documents Approved in 2012
VIII. Standing Lead Task Group Reports
   • Wood, Metal, and Concrete Materials Task Group
   • Mechanical Equipment Task Group
   • FRP and Plastics Task Group
   • Tower Operations Task Group
   • Hazard & Environmental Protection Systems Task Group
IX. New Business/Old Business

I. Call to Order
II. Introduction of Attendees
III. Approval of 2016 Committee Workshop Minutes
IV. Status Report - R&D Pitot Study
V. Active Task Groups:
   • ATC-105 (Acceptance Test Code)
   • STD-201 Certification
   • STD 202 Publication
   • PFM-143 Airflow Testing
   • ATC-128 Sound Test Code
   • ATC-140 Drift Measurement Test Code
   • Sound Certification Task Force
   • Water Usage and Measurement Task Force
VI. Task Group Meeting Schedules
VII. New Business
VIII. Adjourn

continued on page 16

Make your plans to attend
Future Meetings for CTI

Annual Conference
February 5-9, 2017
Sheraton New Orleans
New Orleans, LA

Committee Workshop
July 16-19, 2017
Hilton Orlando
Lake Buena Vista
Lake Buena Vista, FL

Annual Conference
February 4-8, 2018
Hilton Houston North
Houston, TX

Committee Workshop
July 15-17, 2018
La Cantera Resort
San Antonio, TX

Annual Conference
February 5-9, 2019
Sheraton New Orleans
New Orleans, LA
THE 2017 CTI ANNUAL
Again this year the Technical Sessions will run simultaneously between Grand Ballroom A&B and Grand Ballroom C
Sunday, February 5, 2017
Monday, February 6, 2017
3:00p - 5:00p  - Board of Directors’ Meeting with Committee Chairs  
Grand Conteau
4:00p - 8:00p - Registration, Armstrong Foyer
5:00p - 12:00a - Hospitality Suite Open (Bar Closes at 9:30p) - Armstrong Ballroom  
- Super Bowl Party -
6:00p - 8:00p - Speaker Ready Room, Grand Ballroom E

TP17-01
Blade Dynamics
Nicola Romano, Cofmiso Srl
Nicola Romano, born in 1960, Italian. Master in Mechanical Engineering at the University of Pisa - Italy. Presently, technical director at Cofmiso Srl, Industrial fans manufacturers, where he manages the engineering department. Formerly, Technical Director at Cabi Cattaneo, Milan - Italy, and at Cosmos SpA, Livorno - Italy, two companies operating in the military for Chemical and Nuclear submarines field. Main activities were propeller and pressure hull design, hydrodynamics, mechanics and dynamics of structures. The usual way of designing large fans is with wide and stiff blades rapidly connected to the hub. This way leads, often, to high-time-dependent load variations causing high vibration amplitude and high stress. Both stress and vibrations are strictly related to the blade’s dynamic response to the aerodynamic force’s pulses. A proper choice of the blades’ mechanical and physical characteristics can resolve in a substantial reduction of the blades’ dynamic response. Cofmiso, established in 1975, has since then continuously studied blades’ mechanics, with regard to both fiberglass and aluminum blades.
9:00a - 9:30a

TP17-02
Can Rusty Surfaces be Effectively Passivated to Reduce Further Corrosion
Prasad Kalakodimi, Ph.D. and Raymond M. Post, ChemTreat, Inc.
Prasad Kalakodimi received a Master’s degree in physical chemistry at Andhra University and a Ph.D. in Electrochemistry and Analytical Chemistry in 2001. While in India he served as the Engineering Technical Leader at the John F Welch Technology Center in Bangalore and as Product Manager of the entire operation range in the Salt Water Desalination Systems at GE Water. Dr. Kalakodimi is currently the Director of Research for ChemTreat in Ashland, VA.
The ability to protect rusted surfaces is of critical importance to industries and municipalities that rely on pipes and other corrosion inhibition rarely encounters a truly clean metal surface, except perhaps immediately after a chemical cleaning. In the study presented in this paper, advanced electrochemical methods including electrochemical impedance spectroscopy (EIS), cyclic polarization (CP), and open circuit potential (OCP) were used to evaluate the effectiveness of corrosion inhibitors in passivating rusted surfaces. The relative performance of several traditional and advanced corrosion inhibitors is provided together with a mechanistic discussion.
9:00a - 9:30a

TP17-03
Distribution – Distribution – Distribution
James L. Willa, Willa, Inc.
James L. Willa has been a consultant for over 25 years and is President of Willa, Inc. in St. Louis, Missouri. Mr. Willa was Vice President and President of a major cooling tower manufacturing company (23 years). He has worked extensively with the Cooling Technology Institute as Field Engineer (4 years) and Manager (9 years). He performed all the testing and inspecting for 13 years with the CTI. He has been Chairman of the CTI Engineering Standards and Maintenance Committee and the Operating Seminar. He has conducted research for several of the CTI bulletins, Certification Program, and the Performance Curves “Blue Book”. He has twice served as President of CTI and several times as a board member. He has been a member of several technical organizations, has written and published numerous papers, has given many presentations at conferences, and written much of the software in use today for predicting water distribution, how to improve the distribution, and how to continue successful water flow are included. Also included is a sample calculation of megawatt loss in a thermal electric generation plant and resultant loss of dollars, due to poor water distribution.
9:30a - 10:00a

TP17-04
Bioflooding Control in Industrial Water Systems
Brian Corbin, The Dow Chemical Company
Brian Corbin is a Customer Application Specialist at Dow Microbial Control responsible for the Water Treatment segment within the North American Customer Application Center. He is responsible for providing technical service and driving growth for all existing and new NAA Water customers. He holds a PhD in Microbiology and Molecular Genetics from the University of Texas Health Science Center at Houston and completed a post-doctoral fellowship at Vanderbilt University.
Failure to control bioflooding in industrial water systems can lead to reduced system efficiency, microbiologically influenced corrosion, and increased downtime. Water treatment programs that include a combination of oxidizing and non-oxidizing biocides provide a broad-based approach to microbial control to minimize the negative impact of bioflooding. In this paper, we will discuss the value of non-oxidizing biocides and industry best practices to control bioflooding in cooling systems. The paper will discuss recent innovations in solid biocides and the numerous advantages over their liquid counterparts. Synergy between oxidizing and non-oxidizing biocides will also be discussed and treatment recommendations presented.
9:30a - 10:00a

TP17-05
A Study on Bio-fouling Characteristics of Contemporary Trickled and Modular Splash Fills
Angela Zaorski and William C. Miller, Brettwood Industries, Inc.
Angela Zaorski is a Scientist with Brettwood Industries, Inc., based. She has been with the company since 2013. In 2008 she graduated with a MS degree in Physics from Lehigh University. Her duties at Brettwood include physical testing of cooling tower fills. These include but are not limited to compression, span, and flammability. She has expanded her experience at Brettwood to include thermal testing for the cooling tower products and with her knowledge of biology has taken on the fouling project to understand the biological impacts for the cooling tower industry. The development and marketing of contemporary modular trickle and splash fills has yielded a perception that any “wire frame model” type fill offers similar resistance to sand and organic velocity. Laboratory testing and real world experiences have shown that these fills exhibit similar responses to bio-fouling problems as film fills with respect to product design and flute geometry. A systematic laboratory method of evaluating weight gain due to bio-fouling and sediment accumulation illustrates the effects that these different design elements have on the actual fouling resistance of this type of fill.
9:30a - 10:00a

TP17-06
Modelling Lead and Copper Corrosion and Solubility
Robert J. Ferguson, French Creek Software, Inc.
Rob Ferguson began modeling water chemistry in the early seventies and wrote much of the software in use today for cooling water evaluation and control. Major career accomplishments are reflected in publications on developing scale and corrosion inhibitor models, real time control of scale inhibitor feed rate, computer profiling of the entire operating range of cooling systems, and computer modeling of water reuse and alternative water sources. Mr. Ferguson worked in R&D, marketing and software development for several major water treatment service companies prior to co-founding French Creek Software in 1996. He did his undergraduate work at the United States Naval Academy and the University of Minnesota, receiving a BS in Biochemistry from Minnesota in 1971.
This paper describes a novel approach to computer modeling of lead and copper corrosion, and the transport of the metals through the water distribution system. The soluble lead and copper transport through a distribution system is modeled based upon the maximum solubility of these metals over the temperature and pH range likely to be encountered from the water source, through the high end of the expected temperature range in hot water heaters and dishwashers. The ion association model calculations include the impact of phosphates and polyphosphate treatments on lead and copper solubility. Similar methods are used to determine the maximum soluable inhibitor concentrations in industrial and municipal systems. Corrosion rate models are developed and used for the prediction of lead, copper and mild steel corrosion rates. Generalized models are discussed as well as the development of models for specific water source or blend based upon field and/or laboratory testing.
9:30a - 10:00a

continued on page 11
Again this year the Technical Sessions will run simultaneously between two separate Ballrooms. Look closely to see which paper you want to attend.

**CONFERENCE PROGRAM**

Monday's Technical Sessions running simultaneously between Grand Ballroom A&B and Grand Ballroom C

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**TP17-07**

**Wet-Dry Technology to Abate the Visible Plume from an Existing Cooling Tower**

Mark Scholl, Alliant Energy and Jean-Pierre Libert, Evapco Inc.

Mark Scholl has over 20 years of experience in the power sector, focused primarily on the operations, maintenance, start-up and commissioning of combined cycle power plants. Mark managed the Riverside Energy Center in Beloit, WI for over 10 years, first as part of Calpine Corporation and later, with Alliant Energy’s Wisconsin Power and Light division. Presently Mark is part of the Wisconsin Power and Light Strategic Projects department, involved in the development, design, and commissioning of a new 2x1 combined cycle plant.

Alliant Energy’s Riverside Power Plant in Beloit, WI undertook a cooling tower upgrade project in 2015 to reduce the visible plume from the existing wet cooling tower at a combined cycle power plant. The plume was impacting yard operations at an adjacent Operations Center, several residences, and a high traffic county highway. Several different options were investigated and Evapco’s DAP® wet-dry technology was ultimately selected for this demonstration test. This paper will discuss the challenges of the project and how they were resolved: operational results of the wet cooling tower in winter with significant plume impact, permit limitations, retrofit and installation of metallic heat exchanger coils in the existing FRP cooling tower while in operation, water management issues while utilizing existing plant piping, startup and measurement of the efficient and plume characteristics of the modified cell, permitting and planning of future activities to retrofit the entire cooling tower.

**SESSION TIMES:**
- **10:00a - 10:30a**
- **10:30a - 11:00a**

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**TP17-08**

**Design, Cooling Tower System to Reduce the Risks of Transmitting Legionnaires’ Disease**

Mario Bellavance, Blue Heron Cooling Tower Inc.

Mario Bellavance is a mechanical engineer that graduated from École de technologie supérieure. Afterwards, he completed a Masters in Engineering from l’Université de Sherbrooke. He began working in the cooling tower industry in 1995. He occupied responsibilities in Cooling Towers Rebuilding and Upgrading. He’s the founder of Blue Heron Cooling Tower Inc. Now consultant, he works to help Cooling Towers operators to protect public health by successfully managing the risk of Legionellosis. He delivered a previous speech during 2015 CTI Winter Conference. Upgrade your Cooling Tower’s Maintenance Program to protect Human Health.

ASHRAE Standard 188-2015 established minimum legionellosis requirements for building water systems. When a building survey determines that it has an open and closed circuit cooling tower system, the designer then hazard conditions such as no-flow and low-flow portions of the piping, equipment siting that inhibits access to the equipment for the required maintenance, vapor and water droplets discharging into occupied spaces and so on should be addressed. Considering that system design is often ignored while implementing a management program to the risks of transmitting Legionella, the speaker will present case studies for discussion.

**SESSION TIMES:**
- **10:00a - 10:30a**
- **10:30a - 11:00a**

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**TP17-09**

**Time and Temperature Dependent Mechanical Behavior of PP Fills**

Nina Woicke, ENEXIO Water Technologies GmbH

Born on 17 Nov 1975 in Kiel (Germany). Engineering degree in process engineering in 2002 Ph.D. in Polymer Engineering in 2006. Since then head of R&D of GEA 2H Water Technologies GmbH and responsible for fill design and material composition. Mechanical behavior of plastic components are not only dependent on the pure load or load case (e.g. bending vs. pure compression), but also on the loading time and temperature. The impact of these two factors will be discussed in this paper based on different testing results for polypropylene. Additionally a simplified viscoelastic model has been derived from that data to get a general idea for the engineering of plastic fills.

**SESSION TIMES:**
- **11:00a - 11:30a**

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**TP17-10**

**Advantages of Mixed Oxidant Solutions (MOS) in Industrial Cooling Water Systems**

Michael Dorsey, AquaCorr Services; Matt Walker, Design Controls

This paper looks at the benefits of using a MOS in cooling water systems over traditional biocidal treatment methods for the following reasons: Microbiological control is critical in industrial cooling water systems. Traditional treatment programs consist of oxidizing and non-oxidizing chemicals. Oxidizing biocides have limited effectiveness in high pH environments while non-oxidizing biocides are expensive and hazardous. Onsite generated MOS is safe, inexpensive and effective in high pH water evaluation. These different treatment programs we monitored halogen levels, and microbiocidal activity in industrial cooling water systems in similar cooling water systems. Results were recorded and compared over a period of time. The results of this test demonstrate that MOS solution can be a more effective biocide treatment program by providing better overall microbial control as a safer and less expensive program. The conclusion is that all industrial cooling water systems are unique. However, microbiocidal control does lead to the effectiveness of the biocidal program in that given application.

**SESSION TIMES:**
- **11:00a - 11:30a**

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**TP17-11**

**New Laboratory of the Cooling Tower Research in the Czech Republic**

Pavel Vitkovic, Czech Technical University in Prague

Pavel received his Master Science degree in industrial technology from the Slovak Technical University in Bratislava, Slovak Republic. He got Ph.D. in Fluid mechanics and thermodynamics from the Czech Technical University in Prague, Czech Republic. His Ph.D. was on the topic: Effect of Counter Flow Airstream at Water Distribution Characteristic of the Nozzle with the Spray Plate. Since 2006 he has been working in the department of fluid mechanics and thermodynamics. He is now a leader of the Cooling Tower Research Group at the department.

This year we are starting to build a new laboratory for the cooling tower research. Its location is in the central Europe near the capital city of Czech Republic Prague. The new laboratory consists of hall laboratory and exterior experimental facilities. In the new laboratory is the experimental test cell for drift elimina- tor testing. This facility can be used for fill measurement also. Experimental cells for dry and wet cooling towers are placed on the exterior of the new laboratory.

**SESSION TIMES:**
- **11:30a - Noon**

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**TP17-12**

**Current Microbiological Control Techniques in Cooling Tower Water Systems May Not be Controlling Legionella Bacteria**


Paul has over 55 years’ experience and knowledge of water treatment chemicals for use in cooling tower water systems. He provides expertise in problem solving and independent evaluation of water treatment programs and provides training workshops on cooling water, boiler water, and waste water. He has authored over 150 technical papers covering all phases of water problems and practical water treatment. Mr. Packowicz is a member, past president and active on the water committee of the Cooling Technology Institute, member and on the executive committee of the International Water Conference, member and past chairman of several committees including the National Association of Corrosion Engineers, member of AWWA, ASHRAE, and WaterReuse Association.

Due to the recent outbreaks of Legionnaires Disease such as in New York City it was decided to investigate how and why this could have occurred by cooling tower water systems that were chemically treated prompting a detailed review of the traditional microbiological treatment applications in numerous cooling tower water systems in all types of industry systems to see if there are any reasons that Legionella Bacteria could still be present. The review showed that traditional microbiological control techniques might be incorrect and misleading in controlling Legionella Bacteria due to the way the microbiocides are being applied. This study and the results suggest new application and monitoring methods should be adopted.

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**The CTI Office has worked hard to schedule a program that fits everyone’s needs. Incidentally arise that may cause changes and/or omissions to parts of the program that are out of our hands. Our apologies if this happens.**

continued on page 12
Novel Methods to Characterize Cooling Tower Fill Fire Resistance
Jia Shen and Karl Koch, Brentwood Industries Inc.

Jia Shen joined the R&D department of Brentwood Industries Inc., Reading, Pennsylvania as a Plastics Engineer in 2013. He received the ME degree in polymer materials and engineering from Shanghai Jiaotong University, Shanghai, China, in 2006, and Ph.D. degrees in plastics engineering from University of Massachusetts Lowell, Lowell, MA, in 2013. Jia’s main areas of research are formulation, compounding, injection molding, and characterization of thermoplastic materials. ASTM #84, “Standard Test Method for Surface Burning Characteristics of Building Materials”, was adopted as a product test by CTI and has presented inaccuracy in characterizing the fire resistance of a cooling tower fill. The most common sources of ignition in cooling towers are burning plastics or extremely high temperature metals. In the proposed test methods, burning polypropylene (PP) and stainless steel plate at 1100°C were applied to the top of cooling tower fill samples. The weight loss of media, burning time, and propagation methods, burning polypropylene (PP) and stainless steel plate at 1100°C were applied to the top of cooling tower fill samples. The weight loss of media, burning time, and propagation of the flame were recorded to characterize the fire resistance of the product.

Project Neptune: International Collaboration for High Wind Load Cooling Tower Design Solutions
Paul Cerullo and Melanie Gatbonton, Energy Development Corporation and Andjelko Design Solutions

The Energy Development Corporation (EDC) is an owner and operator of geothermal power plants in the Philippines. The Southeast Asian region is prone to typhoons and the Philippines encounters an average of 20 typhoons each year. In 2013, the Philippines was hit by Typhoon Haiyan, which was the strongest storm ever recorded. The country sustained over 6,300 deaths, and heavily destroyed the power plants. This paper will focus on how the cooling towers were rebuilt and strengthened, and how a unique solution was implemented to reinforce the fan cylinders to enable them to sustain 300 kph wind loads.

Should EDF Switch from EN 14705 Long Term Performance Tests to ATC-105 Short Term Performance Test
Christophe Daquenney, EDF

As the owner of 32 large cooling towers, EDF has been performing its own thermal performance acceptance tests during the past 30 years. The company invests a lot in verifying as accurately as possible that a cooling tower reaches the guaranteed year average performance. EDF uses a “long term” test procedure developed in the 80’s by EDF’s Research department. “Long Term” means data acquisition running from 3 to 9 months which implies specific attention during the whole period and increases the cost of the test. Five years ago EDF became more involved in ATC-105 CTI conferences and has gotten involved in ATC-105 CTI task group.

Afternoon Schedule for
Monday, February 6th
12:15p - 1:45p Group Luncheon, Armstrong Ballroom
2:00p - 3:30p Water Treating Panel Discussion, Grand Ballroom A&B
3:00p - 4:00p Technical Committee Meetings
3:45p - 5:00p Water Treating, Grand Ballroom C
5:00p - 12:00a Hospitality Suite - Armstrong Ballroom (Bar Closes @ 9:30p)
6:00p - 9:00p Monday Night / Hospitality Suite

If you are new to our conference and seem to be a little overwhelmed look for the “Yellow” name badges). These members will be able to help you and answer any questions you may have.
TP17-21
A New Practical and Reliable Approach to the Vibration Monitoring of Cooling Tower Fans
Colton Bach and Amando Soliz, Machine Saver Inc.

The purpose of this paper is to outline the challenges associated with Vibration Monitoring and why it is extremely necessary—the industry direction and how it has changed dramatically in the past 50 years—what vibration technology is available now—the advantages and disadvantages of different reliability plans for end user customers—cost associations and a data study of different scenarios reliability engineers are tasked with today.

Design Considerations for Axial Flow Fans
Bhunuk Modi, Hudson Products Corporation

Bhunuk Modi has the title of ‘Fan Engineer – R&D’ at Hudson Products and is working on designing new fan blades for the cooling tower and ACC industry. His responsibilities also include troubleshooting customer problems related to fan performance, vibration and noise. He has a BS in Aeronautical Engineering from Anna University, India and a MS in Mechanical & Aerospace Engineering from Syracuse University.

Low Pressure Axial flow fans, sometimes referred to as Propeller fans, are used in a variety of industries such as oil and gas, power plants, HVAC, etc. for cooling purposes. The size of such fans vary from as small as 6 inches, typically used in data center cooling, up to 50 ft, used in Cooling Towers and Air-cooled Condensers. With the concern about energy savings becoming grave and the government imposed standards and subsidies, designing an optimum efficiency fan has become very valuable. Research engineers have been striving hard to strike a balance between airflow produced and power consumed that will make the fan of optimum efficiency. Hence, it is very valuable for everyone dealing with axial fans to understand the various parameters involved in designing an efficient axial fan. This paper is focused on delineating the few fundamental design considerations and methodology that can be adopted for development of axial flow fans which are used in Air-cooled Heat Exchangers, Cooling Towers and Air-cooled Condensers, the size of which range from 5 feet to 50 feet. The author’s intention is to direct attention to the aerodynamic sizing and optimization and only briefly cover the structural design of the fan.

Using Direct Drive Technology for Improved Reliability and Efficiency in Wet Cooling Towers
Thomas Weinandy, Baldor/ABB

This paper discusses the development of low speed, permanent magnet motors and how they can be used in direct-drive applications to eliminate the gear-box, NEMA motor, drive shaft, and disc couplings from field erect cooling tower designs. Improved reliability of cooling tower fan drives is now possible due to advancements in motor technology as evidenced over the last 9 years. Case studies are presented where cooling tower fans have been re-turbolentized, design optimizations, best practices, performance data, maintenance, air flow considerations and efficiency comparisons will be discussed.

Simplifying Corrosion Control with a Safer Choice Inhibitor
Eric Ward, Rivertop Renewables

Mr. Ward has twenty years of experience testing scale and corrosion inhibitors for industrial cooling water and petroleum production. I have worked for Alco Chemical, Kemira Chemicals, BWA, and currently Rivertop Renewables. He has played lead roles in the development of new products, laboratory capabilities and test methods for each company. Corrosion projects have included the development and evaluation of inhibitors for ferrous and yellow metals in cooling water and ferrous metals in petroleum production. Scale projects have included the development and evaluation of inhibitors for most all calcium scales, barium sulfate, metal silicates and silica. He holds compositional patents for both scale and corrosion inhibitor technologies. He has also written and presented papers on new corrosion inhibitor technologies at NACE and CTI and have co-authored papers on scale inhibition for both NACE and ART.

It is well known that phosphorous-based corrosion inhibitors cause fouling with calcium if they are not adequately treated with a stabilizing product to prevent foaming precipitate. This shortcoming makes this stabilizing product an integral component of any phosphorous-based inhibitor program. In this paper, a new corrosion inhibitor will be presented that provides a single-component replacement for the aforementioned dual-component system. This new inhibitor can not only replace phosphorous-based inhibitors; it can simplify the traditional corrosion inhibition programs for mild steel. This new inhibitor performs well across a wide range of hardness conditions and pH values, it allows for the reduction of the product used to stabilize phosphorous-based inhibitors, and is an environmentally friendly alternative for corrosion control. It has also shown excellent compatibility with other commonly used corrosion inhibitive chemicals. To demonstrate this new corrosion inhibitors performance benefits, both laboratory and field performance data will be presented.
Non-Destructive Evaluation of Structural Elements of Cooling Towers
Narendra Gosain, Ph.D., Ray Drexler and Mark Williams, Ph.D., Walter P Moore And Associates

Narendra Gosain is a Senior Consultant in the Diagnostics Services Group of Walter P Moore. In his 43 year career with Walter P Moore, Dr. Gosain has been involved with several projects throughout the United States, including commercial, industrial, and medical structures. In 1999, Dr. Gosain started a new service line in Walter P Moore called the Diagnostics Services Group that is dedicated to structural restoration, rehabilitation, forensics and litigation support work. He served as the Executive Director of this group until February 2009. Dr. Gosain’s focus is now on serving as a technical consultant for complex structural rehabilitation challenges and forensics related work.

Wood, steel, and concrete have been used as structural materials in cooling towers for decades. When evaluations needed to be done to understand the structural integrity of the materials used after years of service of the towers, specialized procedures were developed to characterize the condition of different materials. These ranged from visual to in situ tests using various techniques for different materials. This paper describes some of the non-destructive testing techniques used for structural elements in cooling towers with some case histories.

9:30a – 10:00a

Energy Performance of Evaporative Recovery (ER) Using Cooling Tower & Coil Arrangements
Mr. Salem, Air2O Cooling LLC and Ayman Youssef, Saudi Aramco

Mr. Salem is the Co-Founder and the CTO of AIR2O Cooling LLC. Mr. Salem has a B.Sc. in Mechanical Engineering and Diploma of Business Administration from California, USA. He holds several patents for the Indirect/Direct Evaporative Cooling (IDEC) technology. Mr. Salem has over 20 years of hands-on HVAC experience and in consideration of an internationally-recognized expert in the sustainable energy saving solutions, with special focus on energy recovery systems. Mr. Salem taught several engineering courses at San Jacquier College Collage and Fresno Institute of Technology, California-USA. Mr. Salem is one of the pioneers of outdoor cooling systems. He headed the design of one of the largest outdoor cooling project in the world (Universal Studio Singapore Theme Park). Currently Mr. Salem is leading the product development of AIR2O’s revolutionary IDEC CRS series product line and its introduction in the American, European & Middle Eastern markets.

This paper evaluates the energy savings potential of Evaporative Recovery (ER) using cooling tower and coil arrangement as fresh air pre-cooling in hot and humid climatic conditions. Energy saving chart was generated for various climatic conditions across the USA to predict the energy performance of ER using cooling tower and coil in fresh air pre-cooling applications. Results show that ER using cooling tower and coil has an energy saving range between 40% to 90% higher than those of thermal wheel and run-around coils.

10:00a – 10:30a

A Fresh Perspective on Controlling Yellow Metal Corrosion
Jon Cohen, ChemTreat, Inc.

Jon is a Technical Staff Consultant with ChemTreat, Inc. located in Richmond Virginia. He has over 25 years of professional experience in all aspects of water treatment. Jon has authored papers for and made presentations at various trade organizations including: ASHRAE, CTI, WaterUse, Fuel and Ethanol Workshop and NASA. Jon is a member of several ASHRAE Standards committees including ASHRAE/ANSI 188-2015, ASHRAE 191P and ASHRAE 64 and also active on the committees writing ASHRAE Guideline 12 and CTI Guideline 159 on Legionella. He is also active on ASHRAE society-level committees, current Vice Chair of the Conferences and Exposition committee, ASHRAE technical committees, CTI Technical Committees and a current member of the Board of Directors for CTI. Jon has a B.A. in Biology from Drake University, a M.A. in Chemistry Engineering from the University of Illinois Chicago and an M.B.A. from Northern Illinois University. He also holds the LEED AP and CWT designations.

Current methodologies for using azoles to control yellow metal corrosion have existed for years with little advancement. Although these strategies have met corrosion rate requirements for a majority of industrial systems, there are still many failures due to corrosion of yellow metals. This paper will highlight some mechanisms of yellow metal corrosion, new data on the effects of halogens on azoles and a new control strategy.

9:00a – 9:30a

Failure of Building Water Systems: How to Plan for Success and Manage Liability
Adam Green, Baker Donelson Bearman Caldwell & Berkowitz, PC and Robert J. Cunningham, Arthur Freeman Associates

Adam Green is a construction, commercial litigation and toxic tort attorney with the national law firm, Baker Donelson Bearman Caldwell & Berkowitz, PC. Over the past 15 years, he has successfully defended clients in disputes relating to the catastrophic failures of building water systems and mechanical equipment on a national scale. He is regarded as one of the nation’s premier attorneys in chemical water treatment having handled cases ranging from small equipment failures to Legionella related fatalities.

The premature failure of building water systems and mechanical equipment can result in large liabilities. The resulting lawsuits reflect that the reasons for these failures are both common and, in many instances, avoidable. Some of the usual suspects include: (1) the lack of clearly defined scope of work and responsibilities; (2) failure to prepare and follow comprehensive job specifications; (3) lack of proper coordination for passivation and start-up; (4) failing to understand and coordinate responsibilities after turnover; and (5) lack of proper documentation leaving you susceptible to a “red-light swarming contest.” This publication identifies common scenarios and offers suggestions to manage risk.

9:30a – 10:00a

How to Choose a Biocide Program for a Recirculating Cooling System
Christopher Baron, ChemTreat, Inc.

Chris is a Technical Staff Consultant with ChemTreat where he focuses on preventing microbial contamination and excess corrosion in cooling and process waters. Preventing microbial growth in recirculating cooling systems is crucial to maintain productivity at your site and extend the life of your capital assets. Choosing the correct biocide program for your particular system requires assessing factors other than free chlorine levels and planktonic microbe counts. This paper will describe various microbial growth control technologies, how to choose among them, and how to monitor the performance and value of the program chosen.

9:00a – 9:30a

Earn
PDH Credits
while meeting and working with others in the industry.
(Information when you register)
10:00a - Noon
Technical Committee Work
• Engineering Standards & Maintenance Grand Ballroom D
• Performance & Technology Grand Ballroom C
• Water Treating Grand Ballroom A&B

Noon - 2:00p
Owner Operator Seminar (w/box lunch)
Grand Ballroom D

Noon - 2:00p
Lunch on your own

2:00p - 3:00p
Services

2:00p - 4:30p
Grand Ballroom C

4:00p - 8:30p
Table Top Exhibits
list of Exhibitors [to date] on page 21
& Hospitality Suite (Bar Closes @ 9:30p)
Armstrong Ballroom

Wednesday, February 8, 2017

7:00a - 10:00a  Services
7:00a - 5:00p  Registration and Paper Sales, Grand Foyer
7:00a - 8:00a  Speakers’ Breakfast, Grand Chenier
8:00a - 12:00p  Educational Seminar, Grand Ballroom C - info on page 4
12:00p - 1:30p  Lunch on your own
1:30p - 5:00p  Technical Committee Meetings - (same rooms as Tuesday)
2:00p - 3:00p  Services
5:00p - 8:00p  Hospitality Suite (Bar closes @ 8:00p) - Armstrong Ballroom

Thursday, February 9, 2017

Thursday’s activities involve the Board of Directors and Committee Chairs only

7:30a - 8:15a  Board of Directors’ (includes Committee Chairs) Breakfast, Grand Chenier
8:30a - 2:00p  Board of Directors’ Meeting, Grand Couteau

Monday Night / Hospitality
February 6, 2017
Come join us for fun, food, music and fellowship with others in the cooling tower industry.
This venue will be open to everyone who have paid their 3 day Registration Fee. Badges are mandatory for attendance and will be checked at the door.
Monday (Feb 8) Session (3:45p - 5:00p)
• Water Treatment Committee Full Committee Meeting
• WTG-161, Jack Bland

Tuesday (Feb 9) Session (10:00a - Noon)
• 10:00a - 10:30a - WTG-126 - Jim Lukanih, Chair
• 10:30a - 11:00a - WTG-130C - Pete Elliott, Chair
• 11:00a - 11:30a - WTG-130A - Matt Wangerin, Chair
• 11:30a - Noon - WTG-147 - Jim Kanuth, Chair
• 11:30a - Noon - WTG-158 - Mark Winter, Chair

Wednesday (Feb 10) Session (1:30p - 5:00p)
• 1:30p - 2:00p - WTG-130B - Bob Cunningham, Chair
• 2:00p - 3:00p - Final Committee Wrap-up
• 3:00p - 4:00p - Open if needed
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Standing Committee Minutes from July 2016

Engineering Standards and Maintenance

Wood, Metal, and Concrete Materials Task Group [Bill Howard]
- Wood, STD-112 Pressure Treatment, and ESG-117 Maximizing Life of Lumber, Joe LaBove, Phillip Poll. Going to ADHOC.
- STD-119 Timber Connection Specifications – Brad Pirrung, Joseph Evans - Going to ADHOC.
- ESG 144 CTI Fastener material Guidelines - Brad Pirrung, Joseph Evans - Going to ADHOC

Mechanical and Electrical Task Group
- STD-111 Speed Reducers - Craig Burris - Changes made and going to ADHOC review.
- Chapter 11 – Electrical Components, James Blake -

FRP and Plastics Task Group [Jamie Bland]
- STD-131 FRP Siding Panels, John Ahern, Brian Fuqua – Going to ADHOC review.
- STD-154 Filament Wound FRP Pipe, Bill Daugherty Greg Deshong, Tom Toth – In ADHOC review.
- ESG-157 Wood to FRP, John Ahern, Ken Mortensen – A few changes were made and then going to ADHOC.
- ESG-164 on Thermoplastic Fill, Nina Woike – Created scope with good discussion.
- STD-137, FRP Structural Products, Ken Mortensen, Byrav Mutnari – Comments reviewed and document will be updated and resent.
- Information, R Seismic Factor, Bill Howard, Tom Toth – Discussion about shake table testing and ASCE LRFD design.

Tower Operations Task Group [Phillip Poll]
- Chapter 1, Richard Hebert, Geoff Eddy – Looking for comments.

Hazard & Environmental Protection Systems Task Group [James Blake]
- Chapter 7 and Chapter 8 Environmental Aspects of Cooling System Operation, Helen Cerra, Ken Mortensen – Making changes.
- ESG-120 Lightning Protection, James Blake – In ADHOC review.
- Fire Protection, Chapter 12 – Document being reviewed with comments from supplier.
- Field Erection – Tom Toth, Ken Pate – Outline by next meeting.

II. Adjournment

Dress Code for the Annual Conference is Business Casual
No Ties!
Standing Committee Minutes from July 2016 continued

Performance and Technology

Ken Martens - SPX Cooling Technologies, Chair
Jared Medlan - Mc Hale & Associates, Inc., Vice Chair
Chris Lazeny - Southern Company, Vice Chair

Task Group Chair Reports
• ATC-105 – Acceptance Test Code for Water Cooling Towers (Larry Burdick, Chair)
  o Voted and approved six sections that were previously discussed.
  o Discussed extrapolation of performance curves beyond usual flow range (90-110%). A presentation was reviewed and will be distributed to voting members; comments to be returned to Larry by September 16. Intend to review at 2017 Annual Conference.
  o Discussion on seasoning of fill, which is not mentioned in 105, but is referenced in ATC-140 (drift code).
  o Teleconference planned for early November 2016.
• Water Usage Task Group (Zin Liu, Chair)
  o Reviewed/defined purpose and scope of the task group. Voting intended to take place before or at the 2017 Annual Conference.
  o Members asked to review J.P. Libert paper from 2016 Annual Conference, and place before or at the 2017 Annual Conference.
• Sound Certification (Doug Randall, Chair)
  o Reviewed changes recommended by Larry Burdick regarding sound measurement for small towers (reflecting and reference planes)
  o Discussed alternate methods for easier measurement/calculation of sound at 50’ above fan discharge.
  o Interim teleconference call is planned for October or November.

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If you are new to our conference and seem to be a little overwhelmed look for the CTI Ambassadors (the members with ‘Yellow’ name badges). These members will be able to help you and answer any questions you may have.
Standing Committee Minutes from July 2016

Water Usage Task Group

• ATC-105 – Acceptance Test Code for Water Cooling Towers (Larry Burdick, Chair)
  - Voted and approved six sections that were previously discussed.
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  - Discussed on seasoning of fill, which is not mentioned in 105, but is referenced in ATC-140 (drift code).
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• Water Usage Task Group (Zan Liu, Chair)
  - Reviewed defined purpose and scope of the task group. Voting intended to take place before or at the 2017 Annual Conference.
  - Members asked to review J.P. Libert paper from 2016 Annual Conference, and place before or at the 2017 Annual Conference.
  - Reviewed/defined purpose and scope of the task group. Voting intended to take place before or at the 2017 Annual Conference.
  - Discussed merits of revising STD-201 OM & RS, versus creating a separate, freestanding RS document. Voted and unanimously approved the freestanding document as the best option.

• Sound Certification (Doug Randall, Chair)
  - Discussed merits of revising STD-201 OM & RS, versus creating a separate, freestanding RS document. Voted and unanimously approved the freestanding document as the best option.
  - Discussed extrapolation of performance curves beyond usual flow range (90-110%). A presentation was reviewed and will be distributed to voting members; comments to be returned to Larry by September 16. Intend to review at 2017 Annual Conference.
  - Teleconference planned for early November 2016.

• ATC-132 Code for Measurement of Sound for Water Cooling Towers (Jean-Laurent Libert, Chair)
  - Voted to approve 30% as the standard glycol concentration (ethylene or propylene). Several editorial revisions were made, including tracer element concentrations.
  - Recommended changes will be gathered for discussion at the 2017 Annual Conference.
  - Task group members were asked to research this topic and share their findings before the 2017 Annual Conference.

• ATC-140 Isokinetic Drift Measurement Test Code for Water Cooling Tower (Chris Lazenby, Chair)
  - Discussion on the addition of coil pressure drop data, but no resolution. A follow up teleconference is planned.
  - Discussed alternate methods for easier measurement/calculation of sound at 50’ above fan discharge.

• Task Group Chair Reports
  - Sound Certification
  - ATC-105 – Acceptance Test Code for Water Cooling Towers
  - Water Usage Task Group

Future issues to be discussed include:
- Need flexible language to show certification revision number on alternate tower locations (e.g., nameplate).
- Still need to decide if changes will be published as an addendum, or new document revision. Paul Lindahl indicated that if CTI self-prints this standard, they should be distributed as changes are made.
- Future issues to be discussed include:
  - Consider how manufacturers can define certified design ranges for coil towers (reflecting and reference planes).
  - Define alternate methods for easier measurement/calculation of sound at 50’ above fan discharge.
  - Interim teleconference may be held in October or November.
  - Recommended changes will be gathered for discussion at the 2017 Annual Conference.

Standing Committee Minutes from July 2016 continued

CTI Seminar (box lunch included)

Owner/Operator Seminar
Tuesday
February 7, 2017
Noon - 2:00p
Grand Ballroom D

lead by:
Frank Michell w/AEP & Jeffrey Parham w/Xcel Energy
Earn PDH Credits while meeting and working with others in the industry. (Information when you register)
The following companies have reserved their table for exhibiting:

5. Baltimore Aircoil
6. Moore Fans
7. IWAKI America
8. Composite Cooling Solutions
9. Polser Fiberglass
10. Rexnord
11. Dynamic Fabricators
12. FasTec International
13. EPP Composites
14. SPX Cooling Technologies
15. ProMinent Fluid Controls
16. McHale Performance
17. Brentwood Industries
18. Wentylatory WENTECH
19. Proco Products
20. Aggreko
21. Midwest Cooling Towers
22. Enexio - 2H Components
23. Kipcon Inc
24. West Texas Cooling
25. International Cooling Tower
26. SPI Bio
27. Galebreakers
28. Cooling Tower Resources
29. Rain for Rent
30. Global Treat, Inc.
31. Hewitech
32. CleanAir Engineering
33. ChemTreat, Inc
34. Denso North America
35. Amarillo Gear
36. Hudson Products Corporation
37. Cofimco
38. Cool Water Technology
39. Bedford Reinforced Plastics
40. EvapTech
41. ProMinent Fluid Controls
42. McHale Performance
43. Brentwood Industries
44. Wentylatory WENTECH
45. Proco Products
46. Aggreko
47. Midwest Cooling Towers
48. Enexio - 2H Components
49. Kipcon Inc
50. West Texas Cooling
51. International Cooling Tower
52. SPI Bio
53. Galebreakers

There are plenty of spaces left for your company to exhibit. Spaces already reserved are indicated by the red boxes. Don’t forget to reserve your space at $1,350/space.

For information on reserving your table contact Virginia Manser at 281.583.4087 or vmanser@cti.org
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- Fiberglass Pipe Saddles, Tanks, Access Hatches, Doors, Molded Stairs & Distribution Splash Boxes.

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# LEGIONELLOSIS

The Institute has addressed Legionella bacteria and the disease Legionellosis for years, and has prepared a guidance document that provides more specific information. This document is available for free download on the Cooling Tower Institute (CTI) website, [www.cti.org](http://www.cti.org). The CTI has addressed Legionella as it relates to cooling tower systems. Other organizations have addressed Legionella as it relates to other water systems. (OSHA, ASHRAE, CDC, etc.)

The only route of exposure by which a person can become ill is by inhalation or aspiration of airborne bacteria deep into the lungs. Contact by skin or by normal ingestion will not result in illness. Legionella bacteria are not a risk for most people and most situations. Only under specific situations can the bacteria multiply and become airborne. Further, few people are susceptible to becoming ill even when exposed.

Legionella bacteria are organisms that can be found in many places, but the populations are very low, and do not pose a risk to most people and most situations. Cooling towers, open and closed circuit, and evaporative condensers are a potential source where conditions could exist that promote Legionella growth and aerosol formation. However, adherence to proper maintenance practices such as those in the referenced documents will minimize the risk from overgrowth of Legionella and aerosol formation.

## References:

- US Centers for Disease Control (CDC), [http://www.cdc.gov/legionella/about/index.html](http://www.cdc.gov/legionella/about/index.html)
- Standard 188 Legionellosis, Risk Management in Building Water Systems, American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), 2015

This article can be found on the CTI website at [www.cti.org](http://www.cti.org).

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## Press Release

**Cooling Technology Institute (Press Release - August 2015)**

### Make your plans to attend Future Meetings for CTI

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 5-9, 2017</td>
<td>Sheraton New Orleans, New Orleans, LA</td>
</tr>
<tr>
<td>July 16-19, 2017</td>
<td>Hilton Orlando, Lake Buena Vista, FL</td>
</tr>
<tr>
<td>July 15-17, 2018</td>
<td>La Cantera Resort, San Antonio, TX</td>
</tr>
</tbody>
</table>

### What’s New in Publications?

CTI's committees are working on a 5-year revision program for each of our Standards and Chapters by looking at each every 5-years and revising and reprinting those that need to be updated with new and better information and reviewing and reprinting those that are correct as stand. As you may realize with the number of Standards and Chapters that CTI has, this will take some time to have each completed and reviewed on a 5-year rotation but our standing committees are well underway. Information will be posted in each Standard and Chapter located on the second page left hand corner that shows when it was revised and the year it will be reviewed again.

We have two reviewed Standards:

- ESB-117 as of 06/2016: Recommendations for Maximum Life of Cooling Tower Lumber - Summary of results. Cooling Tower Institute field study on wood maintenance. Includes recommendations for water and lumber treatment. $8.00
- WTG-141 as of 06/2016: Application of Oxidizing Biocides - This document will cover the use and application of the four major oxidizing biocides used in treating cooling waters: chlorine, bromine, chlorine dioxide, and ozone. The document will help end users and all personnel involved in treating cooling systems to better understand the chemistry, the application methods and the safety and environmental issues concerning oxidizing biocides. $10.00

### Dress Code

For the Annual Conference is Business Casual

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www.aggreko.com
HOTEL INFORMATION

SHERATON NEW ORLEANS, NEW ORLEANS, LA

504.525.2500 or 888.627.7033
(Reference to Cooling Technology Institute Annual Conference Group)

Hotel Cut-Off Date - January 13, 2017

• CHECK-IN TIME IS 3:00PM  • CHECK-OUT TIME IS 12:00PM

Standard Accommodations (Subject to Availability):

Main House: Single - $199++ / Double - $199++
Club Level: Single - $229++ / Double - $229++
Registration Form for the
CTI 2017 Annual Conference
February 5-9, 2017

Complete and send this form to: Cooling Technology Institute • PO Box 681807 • Houston, TX 77268
281.583.4087 • Fax: 281.537.1721 • email: vmanser@cti.org

Early Bird Registration Ends: January 27, 2017

Please type or print clearly all information. A separate form must be completed for each registrant. Photocopies of this form may be used.

1. REGISTRATION INFORMATION:
   I was invited to the conference by: (If applicable give name of the person and their company responsible for your attendance)

<table>
<thead>
<tr>
<th>Aware of the conference after seeing (please check one):</th>
<th>Annual Conference News</th>
<th>Website</th>
<th>First-time Attendee:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Name:</td>
<td>First Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company:</td>
<td>Address:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City/State/Province:</td>
<td>Zip or Postal Code/Country:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone (Country Code/Area/Number)</td>
<td>Fax (Country Code/Area/Number)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td>(*E-mail addresses are used for communicating conference updates, session pre-work and to send any other pertinent information.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   **Badge Information** - First Name or Nickname (as you wish it to appear on your badge)

   Spouse’s Name **Only** if they accompany you to the Conference:

   **PDH CREDITS AVAILABLE - PLEASE ASK AT THE REGISTRATION TABLE!**

2. SPECIAL NEEDS:

   Dietary:  _____ Vegetarian
   Physical:  _____ Please check here if you require special accommodations to participate and email a description of your needs by January 27, 2017 to vmanser@cti.org. We cannot guarantee we can accommodate your request but will do our best.

3. IN CASE OF AN EMERGENCY DURING CONFERENCE, PLEASE CONTACT:

   Name (Please print clearly): ______________________________________
   Daytime Phone: __________________________________________________
   Evening Phone: ______________________________________________
   Email: ________________________________  (Country Code/Area/Number)
   City/State/Province: _________________________________________
   Zip or Postal Code/Country: ______________________________________________
   Company: ________________________________________________
   Address: ______________________________________________________________
   Last Name: ______________________________________
   First Name: _________________________________________

4a. REGISTRATION FEES: (Full-conference or one-day registrants)

<table>
<thead>
<tr>
<th>Check Appropriate Category:</th>
<th>Early Bird Rate by: January 27, 2017</th>
<th>Conference Rate after: January 27, 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTI Member (includes technical sessions Monday, Tuesday &amp; Wednesday)</td>
<td>$850</td>
<td>$950</td>
</tr>
<tr>
<td>Non-Member (includes technical sessions Monday, Tuesday &amp; Wednesday)</td>
<td>$950</td>
<td>$1,050</td>
</tr>
<tr>
<td>Owner/Operators (includes technical sessions Monday, Tuesday &amp; Wednesday)</td>
<td>$500</td>
<td>$600</td>
</tr>
<tr>
<td>One day</td>
<td>Mon</td>
<td>Tues</td>
</tr>
<tr>
<td>Exhibit Hall Pass Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker (one for each paper only)</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>Press (one attendee per company only / ID Required)</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>Honorary Life Member</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

   **Section 4a Subtotal US$**

4b. CONFERENCE EVENTS / OTHER FEES: (Full-conference or one-day registrants)

<table>
<thead>
<tr>
<th>Check Appropriate Category:</th>
<th>Conference Rate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional luncheon ticket(s), Monday, Feb 6, 2017 (for spouse/guest)</td>
<td>$50</td>
</tr>
<tr>
<td>Monday Night/Hospitality combined (Feb 6, 2017 - For those paying the 3 day registration fee)</td>
<td>N/C</td>
</tr>
<tr>
<td>Set of Papers - Hard Copies</td>
<td>$160</td>
</tr>
<tr>
<td>Set of Papers - Flash Drive (w/PDF file of each paper) Available after conference</td>
<td>$160</td>
</tr>
<tr>
<td>Set of Papers - Emailed (in PDF format via wetransfer.com) Available after conference</td>
<td>$160</td>
</tr>
<tr>
<td>Mailing for papers and/or Flash Drive sent to Mexico and/or Canada</td>
<td>$15*</td>
</tr>
<tr>
<td>Mailing for papers and/or Flash Drive sent to all other countries</td>
<td>$20*</td>
</tr>
</tbody>
</table>

   **Section 4b Subtotal US$**

5. PAYMENT

   | Credit Card: Please Charge US$ ____________ to the following credit card. [ ] Visa [ ] MasterCard or [ ] AmEx |
   | Card#: | Exp. Date | CVC Code: |
   
   Cardholder’s Name: ____________________________________________
   Cardholder’s Signature: ____________________________

   **There will be a 15% charge on any credit card refund made - no exceptions!**
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