Consider yourself invited to the 2007 CTI Annual Conference in Corpus Christi, Texas. “The Pearl On The Bay”

Your program committee would like to invite you and your company to the 2007 Annual Conference this year held in Corpus Christi, Texas. This is our second time to hold our meeting in this wonderful city located southwest of Houston on the Corpus Bay. The city of Corpus Christi is full of heritage and culture with many interesting things to see and do. 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. Because of our mission to be a non-profit technical organization we are charged to bring the most timely and latest information in the industry. We have 24 papers being presented in a concurrent format on Monday and Tuesday. Water Treating will have one session and P&T and ES&M will have the other. This is our third year offering this approach. We hope you find it beneficial, with our attempt to add more technical papers to our program.

We will offer an extended time for committee work. In past winter meetings we had only a very short amount of time set aside to do the committee work. This year we have 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.

The Table Top Exhibits on Tuesday from 4:00p – 8:30p will consist of 36 top vendors from our industry to offer you a time to view the products and services they provide. This will held during the CTI hospitality hour.

Our program includes an Owner/Operator Seminar (w/ lunch) on Tuesday from 10:00a – 2:00p. The topics to be discussed are How to Inspect a Cooling Tower and Checking for Chemical Caused Damage in a Cooling Tower.

The very popular Ask The Expert session is back by demand and 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 your questions with good qualified answers.

On Wednesday from 8:90a - 12:00p the Education Program Session will cover Cooling Tower Structural Issues and Air-Cooled Condenser Technology. We will continue on page 23
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Engineering Standards and Maintenance
Toby Daley - T Daley and Associates, Inc., Chair
David Theel - Universal Utility Services, LLC, Vice-Chair

Task Groups:
- Recommended Guidelines for Portland Cement Concrete – Tom Toth
- Industry Cooling Tower Standard – Dave Knight
- Chapter 9 - Materials of Construction – Jess Seawell
- FRP Pipe for Cooling Towers – Bill Daugherty
- Vibration Standard – Ian Fletcher
- Wood Standards - Douglas Fir – Bill Howard
- FRP Structures – Glenn Rarefoot
- Safety Guideline – Julia Taylor
- Treatment Standard, STD-112

Performance & Technology
Anthony DePalma - Tower Performance, Inc., Chair
William F. Immell - Airflo Cooling Technologies, Vice-Chair
David Wheeler - Clean Air Engineering, Vice-Chair

Task Groups:
- Air Cooled Steam Condenser Test Code – Dave Wheeler
- Evaporative Condenser Test Code – Bob Miller
- ATC-140 Drift Test Code Revision – Ken Hennon
- ATC-150 Plume Abatement Test Code Revision – Paul Lindahl
- Technology Review – Tony DePalma
- Certification Committee – Tom Weast

Water Treating Committee
John Zibrida - ZIBEX, Inc., Chair
Ken Mortensen - SPX Cooling Technologies, Vice Chair
Matt Wangerin - Ashland Water Technologies.

I. Call to Order/Announcements
II. Introduction of Attendees
III. Approval of Committee Workshop Minutes
IV. Water Reuse Document Status
V. Task Group Reports
  A. Environmental Issues – Don Erickson
  B. Water Re-Use Document – Phil Kiser
  C. Microbiological Monitoring – Walt Tyler
  D. Filtration of Cooling Water Systems – Tom Cabezut
  E. Oxidizing Biocide, WTP-141 - Dwight Emerich
  F. Ozone Reading Lists, WTP-139 & 139.1 – Ken Mortensen
  G. CTI Document Review – Paul Puckorius
  H. Water Reuse Papers for Cooling Tower Users, WTP-147 – Art Brunn
  I. Deposit Control Monitoring – Mike Standish
VI. Liaison Reports
  • ASHRAE • ASM • AWT • EPRI • NACE
  • IWC • WATERTECH Microelectronics Water
VII. New Business
  Need for new Task Groups?
  Technical Paper Subjects for “targeted” symposium topics

Dress code for the Annual Conference is Business Casual
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New CTI Members for 2006

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Brobat
CleanAir Engineering
Cooling Tower Consulting, LLC
John Cooper & Associates, P.A.
CTS Cooling Tower Solutions GmbH
Daiwa Industries Ptd Ltd
Ecolab, Inc. (fka Midland Research Lab)
Encon India
Engelhard Corporation
EWK S.A.
Gammon, James
Hamon Thermal Europe
Jaeggi Guentner
JS Engineering Industries Pte Ltd
KTR Kupplungstechnik GmbH
M Square Engineers
Manta C.A.
MarTech Systems, Inc.
MM Aqua Technologies LTD
Niha Su Sugumal Kuleleri Sanayi Ve Ticaret A.S.
Ocean Cooling Tower Sdn Bhd
Oden, Allan K
Paltech Cooling Towers & Equipments Ltd
Peralta, Jesse
Power Co. Ltd
PPG Industries, Inc.
Pritchard Cooling Towers Pty Ltd
RSD Cooling Towers
Sain, Gary W.
Sandkuhl Clay Works, Inc.
Superior Water Services, Inc.
Swofford, Michael J.
SymTec International LLC
Terra Cooling Industries Sdn Bhd
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Vail, David
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Performance and Technology

(1-4) Committee Chair - Anthony DePalma
Committee Vice Chair - David Wheeler
Committee Vice Chair - Bill Immell

Water Treating

(1-4) Committee Secretary - Matt Wangerin
Committee Chair - John Zibrida
Committee Vice Chair - Ken Mortensen
Cooling Technology Institute
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.

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37. SPX Cooling Technologies
38. Strongwell
39. Tower Engineering, Inc.
40. Tower Maintenance Service Company
41. Tower Performance, Inc.
42. Water Cooling Equipment Inc.

Make your plans to attend Future Meetings for CTI

February 4-8, 2007
Omni Bayfront Hotel
Corpus Christi, TX

July 8-11, 2007
The Westin La Cantera
San Antonio, TX

February 3-7, 2008
The Westin Galleria
Houston, TX

July 6-9, 2008
Hyatt Regency, Orange County
Garden Grove, CA

February 8-12, 2009
The Westin, Riverwalk
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See page 22 for more information
The purpose of this paper is to discuss what is involved in changing the shade of the standard Cooling Tower Shade, which is a darkgray which at Strongwell is known as slate gray. The slate gray shade typically resists color changes when exposed to UV better than other pigmentations.

Occasionally, Cooling Tower customers request other shades for their applications such as beige or light gray. The purpose of this paper is to discuss what is involved in changing the shade of the standard Cooling Tower Shade, which is a dark gray which at Strongwell is known as slate gray. The slate gray shade typically resists color changes when exposed to UV better than other pigmentations.

While factory-assembled cooling towers are compact enough to be tested and certified in environmental test chambers, field-erected towers can only be tested on-site once built. In order to rate them beforehand, their components must be tested individually in test cells designed to that effect. The size of the test cells, their configuration, operation and instrumentation used to capture the fundamental thermodynamic data require money, time and good engineering skills to be able to acquire meaningful and useful data.

Effective copper alloy and steel corrosion control, along with effective fouling control, are critical for the Cooling Tower applications and what pitfalls could occur with other pigmentations. Occasionally, Cooling Tower customers request other shades for their applications such as beige (tan) or light gray. The purpose of this paper is to discuss what is involved in changing the shade of the standard Cooling Tower Shade, which is a dark gray which at Strongwell is known as slate gray. The slate gray shade typically resists color changes when exposed to UV better than other pigmentations.

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has a BS degree from the University of Houston with 3 years of postgraduate study. He is a member of the Cooling Technology Institute (CTI), and active on the water treatment committee of the CTI. Control of water treatment chemistry utilizing instrument measurement of system water flow and cycles of concentration provides precise control of chemical additives. The chemical testing performed then becomes a check on the control, rather than a primary control output. On-line chemical analysis is usually done & made with emphasis in environmental technology. Opportunities exist to utilize existing instrumentation in some cases along with new measurements to synthesize systems that are effective, economical and fully connected with today's information technology.

10:00a - 10:30a

TP07-07 - Zero Blowdown for Cooling Towers

Sam Owens, CHEMCO International, Inc.

Samuel Rupert Owens received his Bachelor of Science in Mechanical Engineering. He has been a registered Professional Engineer, in the field of Corrosion since 1976. He has forty-five years experience working in corrosion, metallurgy and consulting. He has fifteen years experience in petrochemical refinery failure analysis. Sam is a member of AWT, Association of Water Technologies, he has been a speaker for their annual convention. Sam is a forty-one year member of NACE, National Association of Corrosion Engineers, he is a Recognized Specialist and a Lifetime Member. He has also been a member of the American Institute of Chemists for twenty years. In 1989, Sam started his company, CHEMCO International, Inc. in Corpus Christi, Texas. He serves as the company's president. CHEMCO services cooling towers, buildings, and closed cooling loop systems and manufactures its own chemicals. Converting water hardness and silica to an environmentally desirable complex is the result of a new solution that is environmentally excellent. Opportunities exist to utilize existing instrumentation in some cases along with new measurements to synthesize systems that are effective, economical and fully connected with today's information technology. The base design represents a standard area where there is low water availability. The basis keeps the same turbine cycle size with the special circumstances (or weather). The following water savings methods are evaluated against a base case of 100 percent counterflow cooling towers and are compared to a standard wet cooling tower with single-speed fans. Water savings comparisons are based on annual average conditions and performance.

11:00a - 11:30a

TP07-09 - Twenty Years of Cooling Water Treatment Experience in Manhattan

Dr. Marcus N. Allhams, PE, and Carmine Puglisi, Orival, Inc.

Marcus graduated from Purdue University with a BS in agricultural engineering majoring in soil and water. After twelve years of industrial product development engineering he entered the University of Florida where he earned his PhD in agricultural engineering majoring in food & water with minors in environmental engineering and hydrogeology. He is a registered professional engineer in the states of Illinois and Florida. Marcus spent seven years as Water Quality Manager of a design engineering firm in southwest Florida and ten years with Amiad Filtration Systems as Senior Application Engineer. Marcus is now Vice President of Orival, Inc., a broad spectrum filtration company.

Twenty years ago, Hartz Mountain was concerned about water quality issues on their new HVAC system. Pollen, dust and insects would supposedly be scrubbed from the atmosphere by the large roof top cooling tower that was to provide cooling water to a package unit designed to condition water from a nearby commercial building to condition indoor air. The protection provided by the original solution and minimal maintenance are what convinced management to replace the initial installation with a similar product fifteen years later. This paper will describe the original treatment system maintenance issues over the past twenty years and chemical cost savings.

11:30a - 12:00p

TP07-11 - Water Saving Designs for Power Plant Heat Sinks

Hector Cruz, Rectihed Power Corporation

This paper recommends economical water-saving methods for the design of heat sink systems for a theoretical 750 MW power plant located in either an arid region or in an area where there is low water availability. The basis keeps the same turbine cycle size as a base plant but lets the plant output float. The base design represents a standard cooling tower that would normally be provided for a power plant of comparable size. The cooling tower is designed to give a standard cycle design as a base plant but lets the plant output float. The base design represents a standard cooling tower that would normally be provided for a power plant of comparable size. This paper recommends economical water-saving methods for the design of heat sink systems for a theoretical 750 MW power plant located in either an arid region or in an area where there is low water availability. The basis keeps the same turbine cycle size as a base plant but lets the plant output float. The base design represents a standard cooling tower that was to provide cooling water to a package unit designed to condition water from a nearby commercial building to condition indoor air. The protection provided by the original solution and minimal maintenance are what convinced management to replace the initial installation with a similar product fifteen years later. This paper will describe the original treatment system maintenance issues over the past twenty years and chemical cost savings.

10:00a - 10:30a Moved To Tuesday, Same Time and Place.

TP07-08 - Corrosion-Induced Concrete Deterioration and Rehabilitation of Natural Draft Hyperbolic Cooling Tower

Leandro Etcheverry, Corrosion Restoration Technologies

Leandro Etcheverry, Ph.D., P.E., Structural Preservation Systems. A member of ACI, NACE and ECR, Etcheverry specializes in the diagnostic evaluation and rehabilitation of corrosion-induced deterioration in concrete structures. He received a Ph.D. degree in civil engineering from The University of Texas at Austin. He also holds a BS (Civil Engineering), BA (Economics) and Master of Engineering (Civil Engineering) all from Cornell University, Ithaca, New York. Dr. Zusman specializes in corrosion-induced deterioration exists in natural draft hyperbolic cooling towers, understanding of the deterioration mechanisms as well as effective rehabilitation strategies are required to preserve the value of natural draft hyperbolic cooling towers. Due to the progressive nature of corrosion deterioration, the consequences and costs associated with delaying repairs can be significant. By utilizing state-of-the-art concrete repair technology augmented with high performance construction materials and protection systems, cost-effective repair programs can be implemented. These repair programs can extend service life and protect the value of the high initial investment associated with the construction of hyperbolic natural draft cooling towers.

10:30a - 11:00a

TP07-10 - Seismic Rated Factory Assembled Evaporative Cooling Equipment

Scott Nevins, EVAPCO, Inc.

Scott Nevins is a mechanical engineering graduate of West Virginia University, holding both a BSME and MSME degree. He has over four years of experience with Evapco, Inc. where he is currently a senior product development engineer in the HVAC/Industrial Process group.

The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation for buildings. As of May 1st, 2006, 47 states and Washington DC have adopted the International Building Code. Compared to previous building codes that solely examined anchorage, the International Building Code addresses anchorage, structural integrity, and operational capability of a component following a seismic event. This paper will focus on the International Building Code as pertains to factory assembled evaporative cooling equipment and emphasize the methodology for determining the applicability of the code to specific projects.

11:00a - 11:30a

TP07-12 - Sound Measurement from Field Erected Cooling Towers

Ken Hennon and David Wheeler, Clean Air Engineering

The ITC Test Code for Measurement of Sound from Water Cooling Towers, ATC-128 (2005), defines two types of sound emissions tests for large cooling towers. The objective of the first test method is to quantify the sound level or personnel exposure levels in the working environment of the cooling tower. The objective of the second test method is intended to measure the total sound power emitted by the cooling tower by near field measurements. These near field measurements can then be subsequently projected to calculate sound power at far field points. This paper addresses both types of tests and present data from a recent field test and explains the challenges associated with the successful execution of a field test program.

11:30p - 12:00p

TP07-14 - Smart Vibration Switches

Dr. George Zusman - PCB Piezotronics

Dr. George Zusman serves as a Director of Product Development at PCB Piezotronics IM sensor division. With more than 30 years of experience in industrial vibration monitoring, Dr. Zusman was formerly Director of Engineering, and later, president of Metric Instruments, Co. /PMC-Beta. Prior to Metric, he was President & C.E.O. of TVCont Ltd, where he was also responsible for all aspects of R&D, sales and customer support. Dr. Zusman started his career as an R&D engineer at one of the leading universities in Moscow, Russia. Subsequently, he held numerous R&D and engineering management positions. He holds about 20 patents and has authored nearly 100 technical publications. Dr. Zusman has a doctorate degree in Electronics from Moscow Physical Engineering University and a S. D. in Vibration Monitoring from Interscope Research Institute.

This intelligent, two-wire vibration switch is a new type of device for machinery protection. It has been designed to be a cost effective tool for generating an alarm output but is also capable of shutting down of small to medium-size machinery, such as electrical motors, pumps, cooling towers, fans, and compressors. The device is entirely self-contained with hermetically sealed, stainless steel housing. The unit's appearance is very similar to industrial accelerometer and has the same simplicity of installation. In

continued from page 10

Corpus Christi Ballrooms A & B. Look closely to see which paper you want to attend.
Sewage effluent for cooling has been utilized in the Texas panhandle since the early 1960's. A history of cooling water treatment for electricity production, as well as recommendations for new installations will be presented.

Annual Conference Program continued on page 13
Cooling Water Treatment Using Smart (Controlled) Release Technology
Mike Kloster and Dan Dobrez - Dober Group
A multi-national expert on water treatment, Mike Kloster is an applied to a cooling tower system using a diffusion-based technology utilizing patented coated tablets. The cooling technology provides the desired release rate of the active ingredients in the table core, eliminating the need for mechanical treatment methods. In consistent chemical release, elimination of electrical feed system components, improved program safety for operators, elimination of chemical container disposal issues and is environment all safe.

8:00a - 8:30a
TP07-17 - Antimicrobial Compounds Quat? 
Philip Sweeney, LONZA, Inc.
Philip Sweeney received his doctorate in Organic Chemistry from the University at North Dakota in 1985. He has obtained 16 years or water treatment experience with a concentration in the development and application of microbiological control programs for cooling water, papermaking and recreational pool and spa applications. He holds several patents in the field of water treatment and has presented papers at NACE, TAPPI, AWT and ACS. He enjoys gardening and fishing in his spare time.

Sunlight exposed cooling towers can develop significant algae-related fouling problems. The presence of these algal mats or strings clearly show that the cooling water program is out of control. In addition this fouling will often block the tower fill causing reduced efficacy. The use of oxidizing for algae control is fairly ineffective when used at normally encountered concentrations in the development and application of microbiological control programs for cooling water, papermaking and recreational pool and spa applications. He holds several patents in the field of water treatment and has presented papers at NACE, TAPPI, AWT and ACS. He enjoys gardening and fishing in his spare time.

7:30a - 8:00a
TP07-19 - Efficient One Step Phosphorous and Suspended Solids Removal from Municipal Wastewater
Ben Coulde, Ashbrook Simon-Hartley and Clayton Melancon, Water Filtration Technologies
Ben Coulde has worked for the Baltimore Aircoil Company since Spring 2005, when he began his career as a Marketing Project Engineer and managed the BAC Controls product line. As a Product Applications Engineer, Ben now works closely with customers to determine cost-effective solutions to their needs. After earning his B.S. in mechanical engineering from the University of Maryland, Ben worked for Teledyne Energy Systems as an Applications Engineer, where he designed, operated, and maintained process control equipment and electrical controls for customers. He is pursuing an MBA in Finance at Loyola College in Maryland.

8:30a - 9:00a
TP07-20 - Sea Water Cooling System Design
Neresh Shah and Ranjit Nukka, Fluor Corporation
Neresh Shah is a B.S., M.S. and PhD in Chemical Engineering from the Bombay University Department of Chemical Technology, Matunga, India. He has 25 years of industrial experience in research, process development, design, operation and process engineering. He has worked with Fluor Daniel for over 10 years at various levels in their Greenville, SC and Houston, TX offices. He has published extensively in chemical engineering journals of international repute. Recently application of indirect seawater cooling has become popular particularly in the regions having scarcity of good quality water. This requires careful design of the overall system starting from cooling water/sea water exchangers, sea water cooling tower, cooling tower basin, seawater intake and return basins. Attention must be paid to the interface with seawater supply canals. This paper considers important aspects of designing seawater cooling systems.

9:00a - 9:30a
TP07-21 - New Liquid Biocide Products for Specific Industrial Water Treatment Requirements
Christopher Nalapa, Alieberman Corporation
Christopher Nalapa is an R&D Advisor for Alieberman Corporation in Baton Rouge, Louisiana. During his 26-year career with Ethyl/Aliberman he has worked in many different technology areas such as flame retardants and polyurethane curatives. For the past 12 years, Chris has focused on the field of water treatment where he has developed several new biocide technologies for industrial and recreational use. Chris holds 24 U.S. patents and has authored or co-authored more than 50 presentations and publications. He is a member of the American Chemical Society and the Water Quality Technology Committee.

Liquid biocides continue to be a popular choice for control of microorganisms in industrial water systems and numerous treatment options exist in both oxidizing and non-oxidizing biocide categories. The purpose of this paper is to introduce a family of liquid biocides based on bromine chloride as the active ingredient. These products were developed with the requirements of specific water treatment segments in mind.

Products are available for both the commercial and middle-market segments that deliver the convenience and consistent activity that is much valued in these market segments. Higher activity products were also developed for large-volume heavy-industrial applications that feature activity approaching that of fresh “off-the-line” bleach while still delivering the benefits of a stabilized bromine system. This paper will point out the unique features of this family of products and show comparative field and laboratory data to aid in proper biocide selection.

9:30a - 9:45a - Break
10:00a - 10:30a
TP07-08 - Corrosion-Induced Concrete Deterioration and Rehabilitation of Natural Draft Hyperbolic Cooling Tower, Moved from Monday at same time.

Frank T. Morrison, Baltimore Aircoil Company
Frank Morrison is currently Manager, Global Product Marketing and Business Development at Baltimore Aircoil Company. Frank has worked in both Product Engineering and Marketing & Development at BAC, as well as managed the R&D Labs and the Design Operations Group, before moving to Marketing. He earned a BS in Mechanical Engineering from Drexel University in Philadelphia, Pennsylvania and an MBA from Loyola College in Maryland. Frank is a member of ASHRAE and participates on the ASHRAE 90.1 Energy Committee, TC6 Cooling Tower Technical Committee, and TC3.6 Water Treatment Technical Committee. He holds five patents and has authored various articles and technical papers.

The proper selection of materials of construction is critical to ensuring long life, reduced maintenance, and operational reliability for evaporative cooling equipment. These functional needs must be balanced with the budgetary constraints on each project, both on a first cost and operating cost basis. This paper examines the wide range of materials currently available for components used in open and closed circuit cooling towers as well as evaporative condensers. Whether using galvanized steels, stainless steel, or FRP, we are living in a material world where the right material choices can provide long-term payoffs, but the wrong choices can be costly.

10:00a - 12:00p
Technical Committee Meetings
- Engineering Standards & Maintenance (Laguna Madre)
- Performance & Technology (Matagorda)
- Water Treatment (Corpus Christi Balroom B)

Annual Conference Program continued on page 14

continued from page 12
continued from page 12
The new all-organic closed loop corrosion inhibitor has been developed that can replace the traditional Molybdate-Nitrite products. This product uses a unique combination of three components to provide mild steel corrosion passivation along with a copper inhibitor and polymeric dispersant. A new all-organic closed loop corrosion inhibitor has been developed that can replace the traditional Molybdate-Nitrite products. This product uses a unique combination of three components to provide mild steel corrosion passivation along with a copper inhibitor and polymeric dispersant. The performance results of the new product in actual closed loop system will be discussed. The systems chosen to evaluate the product in field applications represent a variety of water chemistries, metallurgy, biological, and temperature conditions normally encountered.

The 2007 CTI education program will include 4 sessions on cooling tower design, operation, and maintenance. The sessions will particularly focus on gearbox operation and maintenance, tower thermal performance, and design considerations including structural, thermal performance, environmental, and reliability.

The program will include 4 - 1 Hrs Session as follows:

1. Air-Cooled Condenser Technology (Design Fundamentals) - Speaker, Ralph W. Wyndrum III PE:AK Principal Engineer SPX Cooling Technology
2. Tower Fan Vibration Analysis - Speaker, Tom Ritter EnVibe, Inc.
3. FRP Structural Components Wood Versus Fiberglass - Speaker, Richard Altice Strongwell
4. Air-Cooled Condenser Design Practices - Speaker, Jim Cuchens Principal Engineer Cooling Systems, Southern Company

The above order does not necessarily reflect order of presentations.

Meet Jon Bickford of Alliant Entergy, Chairperson for the Owner/Operator Council. Jon is lining up a terrific program for the Owner/Operators on Tuesday, February 6th from 10:00a - 2:00p (box lunch is included). Be sure to check on the registration form that you will be attending so we will have enough seating and enough lunches for everyone. The topics being readied for the seminar are numerical but will be limited due to time constraints. Below is a list of possible things to be discussed:

- Inspecting wood cooling towers, both crossflow and counterflow towers
- Inspecting fiberglass towers, both crossflow and counterflow towers
- Inspecting cooling towers for chemical caused damage
- Fiberglass vs Wood variances for structure material in cooling towers and when to use one over the other
- Water treating technology for large cooling towers
- Wood to fiberglass conversion, how to make the switch

Be sure to check on the registration form that you will be attending this seminar.
## Licensed CTI Thermal Testing Agencies

<table>
<thead>
<tr>
<th>Type</th>
<th>License Agency Name</th>
<th>Contact Person</th>
<th>Telephone/</th>
<th>Address</th>
<th>Website / Email</th>
<th>Fax</th>
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</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Clean Air Engineering</td>
<td>Kenneth Hennon</td>
<td>865.208.6162</td>
<td>7936 Conner Rd</td>
<td><a href="http://www.cleanair.com">www.cleanair.com</a></td>
<td>865.938.7560</td>
</tr>
<tr>
<td></td>
<td>Powell, TN 37849</td>
<td><a href="mailto:khennon@cleanair.com">khennon@cleanair.com</a></td>
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<tr>
<td>A, B</td>
<td>Cooling Tower Technologies Pty Ltd</td>
<td>Ronald Rayner</td>
<td>61 2 9790 5900</td>
<td>PO Box N197</td>
<td><a href="mailto:coolingtowers@bigpond.com">coolingtowers@bigpond.com</a></td>
<td>61 2 9790 5922</td>
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<tr>
<td></td>
<td>Bexley North, NSW 2207</td>
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<td>AUSTRALIA</td>
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<td></td>
<td>Stanley, KS 66212-9720</td>
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<td></td>
<td>Knoxville, TN 37919</td>
<td><a href="mailto:tom.wheelock@mchale.org">tom.wheelock@mchale.org</a></td>
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* 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 for larger towers.

## Licensed CTI Drift Testing Agencies

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<th>Contact Person</th>
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<th>Address</th>
<th>Website / Email</th>
<th>Fax</th>
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<td></td>
<td>Knoxville, TN 37919</td>
<td><a href="mailto:tom.wheelock@mchale.org">tom.wheelock@mchale.org</a></td>
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## Table Top Exhibits and the Exhibitors

Table Top Exhibits and the Exhibitors
**Nueces Ballroom**

**Tuesday, February 6, 2007 • 4:00p - 8:30p**

| 6. BIC | 20. Rohm and Haas | 30. Industrial Cooling Services | | |
| 10. Aggreko Cooling Tower Services | 24. Dober Group | 34. Strongwell | | |
| 13. Fibergrate Composite Structure | 27. Baltimore Aircfoil Company | | | |

Entrance


**Bar Location:**

- **Bar 1:** Table 15
- **Bar 2:** Table 29

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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 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 insure CTI Tests are conducted in a fair, unbiased manner.

Cooling tower owners and manufacturers are strongly encouraged to utilize the services of the licensed CTI Cooling Tower Performance Test Agencies. The currently licensed agencies are listed below.
New Construction OR Repair and Maintenance
Fibergrate has your solution!

**Why Use FRP?**
Corrosion Resistance
Lightweight
Low Maintenance

**Why Use Fibergrate FRP?**
40 Years Experience
Complete Product Line
Worldwide Manufacturing
Three ISO 9001-2000 Certified Manufacturing Facilities
Extensive Inventory

**Wood Replacement Shapes**
- *Square Tube*
  3-1/2”
- *Rectangular Tube*
  3-1/2” and 5-1/2”
- *Channel*
  3-1/2” and 5-1/2”

**Deck Board**

**Wall Panels**

**Structural Shapes**
- *Angles*
- *Beams*
- *Channels*
- *Square Tube*

**Ladders and Handrail**

**Molded and Pultruded Grating**

**Stairs, Walkways and Platforms**

**Fabrication**

**Custom Layed-Up Parts**
Cooling Technology Institute's
MISSION STATEMENT

To advocate and promote the use of environmentally responsible Evaporative Heat Transfer Systems (EHTS) for the benefit of the public by encouraging:

• Education
• Research
• Standards Development and Verification
• Government Relations
• Technical Information Exchange

Objectives

• Maintain and expand a broad base membership of individuals and organizations interested in Evaporative Heat Transfer Systems (EHTS).
• Identify and address emerging and evolving issues concerning EHTS.
• Encourage and support educational programs in various formats to enhance the capabilities and competence of the industry to realize the maximum benefit of EHTS.
• Encourage and support cooperative research to improve EHTS technology and efficiency for the long-term benefit of the environment.
• Assure acceptable minimum quality levels and performance of EHTS and their components by establishing standard specifications, guidelines, and certification programs.
• Establish standard testing and performance analysis systems and procedures for EHTS.
• Communicate with and influence governmental entities regarding the environmentally responsible technologies, benefits, and issues associated with EHTS.
• Encourage and support forums and methods for exchanging technical information on EHTS.

Seminar will be four hours on Tuesday, including lunch. I encourage all owner/operators to attend this informative and educational event. We will again conclude Tuesday’s activities with table top displays. Last year was our first attempt at the displays and it proved to be a great time for fellowship and provided an environment full of educational value. As I mentioned before, this is going to be one great meeting to learn, share and socialize.

In closing, I want to thank all CTI members for their support of our fine organization. If it were not for you, we would have no organization. If you have any questions or suggestions, please feel free to contact me. Take care, happy holidays and I look forward to seeing all of you in Corpus Christi!

Steven Chaloupka
CTI President 2006 and 2007

Earn PDH Credits while meeting and working with others in the industry.
Information when you register
CALL FOR PAPERS

2008 Annual Conference
February 3-7, 2008 • The Westin Galleria • Houston, Texas

The following schedule will begin the process for papers presented at the 2008 Annual Conference:

2007
May 4: Deadline for Abstracts
June 22: Authors Notified by Program Chair
Aug 3: Six (6) copies of draft must be sent to CTI office for review
Nov 2: Final draft, based on review comments and slides due in the CTI office

Abstract Forms can be obtained by contacting the CTI office at 281.583.4087 or email: vmanser@cti.org

What is a Cooling Tower?

A cooling tower is a heat rejection device, which extracts waste heat to the atmosphere though the cooling of a water stream to a lower temperature. Common applications for cooling towers are providing cooled water for air-conditioning, manufacturing and electric power generation. The generic term “cooling tower” is used to describe both direct (open circuit) and indirect (closed circuit) heat rejection equipment. A direct, or open-circuit cooling tower is an enclosed structure with internal means to distribute the warm water fed to it over a labyrinth-like packing or “fill.” The fill may consist of multiple, mainly vertical, wetted surfaces upon which a thin film of water spreads. An indirect, or closed circuit cooling tower involves no direct contact of the air and the fluid, usually water or a glycol mixture, being cooled. In a counter-flow cooling tower air travels upward through the fill or tube bundles, opposite to the downward motion of the water. In a cross-flow cooling tower air moves horizontally through the fill as the water moves downward. Cooling towers are also characterized by the means by which air is moved. Because evaporation consists of pure water, the concentration of dissolved minerals and other solids in circulating water will tend to increase unless some means of dissolved-solids control, such as blow-down, is provided. Some water is also lost by droplets being carried out with the exhaust air (drift).

For more information visit the Cooling Technology Institute at www.cti.org.
Water Reuse
2007 Panel Discussion
Monday, February 5, 2007
2:00p - 3:45p

Phil Kiser and his group of panelist have lined up a terrific Panel Discussion for you to participate in. The utilization of recycled/reuse water is a growing trend in water sourcing. Many parts of the US have water resource limitations based on drought, population growth and/or supply limitations. Industrial and municipal applications of water face an increasingly challenging supply, quality, and quantity issues. Many parts of the Gulf Coast face limited water supplies even in normal conditions. Corpus Christi and other parts of the Gulf Coast have a very limited industrial water supply. Water resources in the region have been severely impacted by drought conditions. The Cooling Technology Institute (CTI) has assembled a panel of industrial leaders to present and discuss water reuse issues. Panelists include Water Service, Manufacturing, Engineering, and Regulatory Professionals presenting insight into water resource implementation and utilization. Many corporations and operators are now facing mandatory reuse implementation or will face both short term and long range strategic planning for utilizing reuse.

The Panelist will review:
• Technical aspects of water reuse issues
• Manufacturing aspect of the use of alternate water supplies.
• Regulatory aspects of water reuse including consumptive use and alternate supply
• Engineering and supply resource development

Mark Your Calendars!
February 4-8, 2007

Here is your check list for CTI’s 2007 Annual Conference. It’s time to begin making your plans.
✓ Pre-Register
✓ Register at the hotel - early!!!
✓ List papers to attend (Mon & Tues)
✓ Monday’s Panel Discussion
✓ Technical Meeting of my choice (Mon, Tues & Wed)
✓ Dinner and Casino Monday night
✓ Owner/Operator Seminar (Tuesday)
✓ Ask the Expert Seminar (Tuesday)
✓ Educational Seminar (Wednesday)

Register today - registration form on page 23 or www.cti.org!

Free Registration
Bring a Guest, bring a number of guests and you could get your registration free!
See page 22 for more information

20 YEARS of meeting your cooling tower needs

• Emergency repairs — quick response!
• Large and small applications
  fiberglass • wood • metal
• Free inspections & evaluations
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The following questions were sent throughout the website to the “Ask The Expert” Committee. This is just a sampling of the types of questions we get from those of every walks of life. Thanks to the committee the CTI is able to reach out in another way to help those in the industry and those who have interest in our Industry.

**Question 1**
Can CTI provide any reference/typical drift values for industrial cooling towers? I found some drift values online in EPA’s AP-42 document but am hoping to find other representative data.

**Reply to Question 1**
The paper “Cooling Tower Emissions Quantification Using the CTI Test Code A TC-140 (TP03-08), provides survey of drift rates for different cooling towers tested over a twenty-five year period. As pointed out in the paper, the drift rates, even for cooling towers with similar drift eliminator technologies, are highly variable. The actual drift rate is highly dependent on the quality of the installation and the condition of the drift eliminators and water distribution system. That said, the drift rate quoted by EPA AP-42 is highly conservative. A cooling tower with drift rate as high as that quoted by AP-42 would have drift eliminators in very poor condition. Manufacturers are currently quoting drift rates of 0.0005 per cent of the circulating water flow. To achieve this level of drift control, the installation of the drift eliminators, must be perfect and there can be no problems with the hydraulics within the tower. A number of older technology drift eliminators actually performed better than much newer technologies because the installation of the older drift eliminators was more uniform.

**Question 2**
I am studying the feasibility of using closed type cooling tower to replace the existing open type. The following issues are of concern:
• Is there another modification of existing water pump or if the pressure drop of closed type coil is lower than the static head of open cooling tower will there be problems?
• Is the pressurization make up unit required?
• Can the open type and closed type cooling towers operate in parallel at the same system?

**Reply to Question 2**
In reply to your questions:
• You can replace an open circuit (assuming you are using a cooling tower) with a closed circuit (air cooler).
• The typical pressure drop in a closed circuit air cooler is 10 to 15 psi. If you replace the open circuit with a closed circuit air cooler you most likely will not need to change the existing pump(s), but be certain to design the air cooler to match the pressure drop/ head available in the existing open circuit. Just be sure to tell the Air Cooler manufacturer what
pressure drop you want in the air cooler.

• The air cooler manufacturer can provide an atmospheric expansion tank for make-up water.

• You can operate the open type and closed type system at the same time in parallel. A good way to conserve water. Just use the open circuit on the hottest ambient days.

**Question 3**

I am reviewing the effects of a “hydrogen economy.” The question arises as to the fate of the waste heat derived from various power-plant technologies. As part of this review, I am trying to estimate, roughly, how much water is lost to the atmosphere from cooling towers, measured, say, in gallons of water per kWh. I am doing this analysis for CCNG, coal, and nuclear plants. I need a “rule of thumb” for these losses rather than a detailed engineering analysis.

**Reply to Question 3**

The calculation of the make-up to cooling tower has 3 parts:

**Evaporation** - Recirculation Rate x Evaporation Rate is about .8% May through October and 0.6% November through April in southern states where wet bulbs approach 80°F. A ton of refrigeration requires 14,000 btu/hr of heat removal (includes inefficiency of cooling tower). Definition of a BTU is the amount of heat to raise 1# of water 1°F. We get 14,000* 1/10 = 1400#/hr recirculation rate to remove the 1 ton of heat. 1400#/hr is equal to 2.8 gpm / 10°F rise in temperature. Evaporation loss = 2.8* 0.008 = 0.0224 gpm/ton for summer conditions.

**Drift** is amount of water droplets that escapes from top of cooling tower. The water loss is dependent on efficiency of drift eliminators. Drift eliminators range from 0.002% to 0.0005%. I would use the 0.00002 x Recirculation Rate for estimation purposes. Per ton, 2.8 gpm* 0.00002 = 0.000056 (this is insignificant for small cooling towers but for large utility and industrial cooling towers it is significant).

**Blowdown** is amount of water that is purged from the cooling tower to control cycles of concentration to prevent fouling and scaling. All cooling towers require blowdown no matter what source of water or treatment program. The optimal cycles of concentration when make-up water and blowdown disposal costs are not a huge consideration is between 5-7 cycles of concentration. Cycle of concentration is measured by taking one of the chemical constituents in tower water and divide it by the same constituent in make-up water. Chlorides are commonly used as the constituent. Blowdown = Evaporation Rate / (C-1) for this example: B = 0.0224 / (5-1) or 0.0056.

The analysis you are looking for should be about the same. The 1% rule of thumb is pretty good approximation. The equations above can easily be adapted for heat rejection for condenser water.
have such speakers as Ralph Wyndrum, III PEAK P.E. with SPX Cooling Technology speaking on “Air-Cooled Condenser Technology (Design Fundamentals)”; Tom Ritter with EnVibe, Inc. speaking on “Tower Fan Vibration Analysis”; Richard Altice with Strongwell speaking on “FRP Structural Components Wood Versus Fiberglass”; and Jim Cuchens P.E. with Southern Company speaking on “Air-Cooled Condenser Design Practices.”

The Panel Discussion on Monday, 2:00p – 3:45p will be on Water Reuse. The utilization of recycled/reuse water is a growing trend in water sourcing. Many parts of the US have water resource limitations based on drought, population growth and/or supply limitations. Industrial and municipal applications of water face an increasingly challenging supply, quality, and quantity issues. Many parts of the Gulf Coast face limited water supplies even in normal conditions. Corpus Christi and other parts of the Gulf Coast have a very limited industrial water supply. Water resources in the region have been severely impacted by drought conditions. The Cooling Technology Institute (CTI) has assembled a panel of industrial leaders to present and discuss water reuse issues. Panelists include Water Service, Manufacturing, Engineering, and Regulatory Professionals presenting insight into water resource implementation and utilization. Many corporations and operators are now facing mandatory reuse implementation or will face both short term and long range strategic planning for utilizing reuse. Operators, owners, and engineers

If you don’t attend any other cooling tower related meeting or conference this year, you don’t want to miss this. The CTI program committee has put together a program that will offer the best opportunity to inform, educate and expand your knowledge about this industry. We hope you come prepared to take full advantage of everything we have to offer you. A great location, outstanding food and entertainment and a conference that will give back to the membership what you want “Information”

I, Glenn Rees, Paul Nelissen, Bill Immell and Gary Geiger, Brandon Rees and John Zibrida, your program committee, invite and welcome you to the 2007 winter conference and meeting.

See you on the Beach in Corpus Christi, Texas.
Glenn Rees
CTI Chairman Program 2007

Free Registration

Bring a Guest, bring a number of guests and you could get your registration free!

That’s right, CTI will give free registration to the person who has the most first time attendees at the Annual Conference due to an invitation by you! The registration form has a place for the attendee to enter the person’s name and company that invited them and a place to check that this is their first time to attend. Get that list ready and start inviting. What a great way to kick off 2007 for CTI.

Don’t forget that Guest

Hotel Cut-Off Date
January 12, 2007
• CHECK-IN TIME IS 3:00 PM
• CHECK-OUT TIME IS 12:00 PM

Standard Accommodations:
• [   ] Single - $125
• [   ] Double - $135
• [   ] Triple - $145

Dress code for the Annual Conference is Business Casual
No Ties!
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) _______________________________________

Last Name: ______________________________________ First Name: _________________________________________

Company: ________________________________________________ Address: _____________________________________________________________

City/State/Province: _________________________________________ Zip or Postal Code/Country: _______________________________________________

Phone (Country Code/Area/Number) ____________________________ Fax (Country Code/Area/Number) __________________________________________

Email: _______________________________ (*E-mail addresses are used for communicating conference updates, session pre-work and to send any other pertinent information.)

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

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 31, 2007 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: ______________________________________________

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

Check Appropriate Category:                                     Early Bird Rate by: Conference Rate after:  

CTI Member (Includes technical sessions Monday, Tuesday & Wednesday) $695 $795

Non-Member (Includes technical sessions Monday, Tuesday & Wednesday) $795 $895

One day Mon Tues Wed (circle one) $500 $500

Exhibit Hall Pass Only $35 $35

Speaker (one for each paper only) N/C N/C

Press (one attendee per company only) N/C N/C

Honorary Life Member N/C N/C

Section 4a Subtotal US$ _______ _______

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

Check Appropriate Category:                                     Conference Rate:

Additional luncheon ticket(s), Monday, Feb 5, 2007 (for spouse/guest) $30

Monday Night Dinner & Casino Night (February 5, 2007) $70

Set of Papers - Hard Copies $125

Mailing for papers sent to Mexico and/or Canada $10*

Mailing for papers sent to all other countries $15*

Set of Papers - CD (w/PDF file of each paper) Available after conference $125

*This cost is for those attendees who purchase a set of the Technical Papers presented and wish to have them mailed. For those attendees in the US there is no additional mailing charge.

Section 4b Subtotal US$ _______ 

Total Amount Due US$ _______  

4c. CONFERENCE EVENTS (Full-conference or one-day registrants)

_______ I will attend the Panel Discussion on Monday afternoon

_______ I will attend the New Member Breakfast on Tuesday morning

_______ I will attend the Owner/Operators’ Seminar on Tuesday

_______ I will attend the Educational Seminar on Wednesday

5. PAYMENT (Please check one)

Enclosed is Check# _______ in the amount of US$ _______ (Please write the registrant’s name on the check)

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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- V-Bar Splash Fill Slats
- Film Pack
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