Chilled Water Plant Operation and Maintenance

March 19–23, 2012
Madison, Wisconsin

Attend and Benefit

✔ Discuss equipment and piping for a central plant with multiple chillers, towers, and pumps
✔ Obtain actual plant data and adjust the plant capacity
✔ Improve the operation and energy use of an existing plant
✔ Develop a testing and maintenance program for critical equipment efficiency and sustainability

Act now, enroll today!
epd.engr.wisc.edu/web/N113

12 Professional Development Hours Accepted

Practical information and approaches for:
- High-performance plants
- Equipment selection and controls for energy-efficient plants
- Pumping and piping arrangements
- Achieving reliable performance and energy conservation including storage and heat recovery
- Commercial, institutional, military, educational, medical, and industrial plants
- Plant expansions or retrofits
- Pump maintenance and testing
- Practical information and approaches for:

Please route this brochure to colleagues who would also benefit by attending.
Chilled Water Plant Operation and Maintenance
March 19–23, 2012 in Madison, Wisconsin

Course Objectives
Improve your physical plant chilled water plant operation and maintenance by attending this practical, proven course. You’ll have the opportunity to review your physical plant chilled water load problems and successes, interacting extensively with our expert instructors and with other participants. Recognizing the complexity of central chilled water plants, the course will consist of in-depth lectures, case examples, hands-on problem sessions, and discussion. Your instructors will emphasize operation and maintenance to achieve sustainability and energy savings.

Discuss Your Plant!
We invite you to bring a flow diagram of your plant, or a portion thereof, for review and discussion during the class or individually with the instructors or other attendees. Please notify the program director.

Hands-On Problem Solving
Class problem-solving sessions will reinforce your learning and broaden your understanding of course topics. Please bring a calculator for use during these sessions.

Chiller Plant Tour (Optional)
Your learning will be enhanced as you tour a University of Wisconsin–Madison central chiller and cogeneration plant. You will receive drawings of the plant's piping system for your review prior to your visit.

Valuable Take-Home References
You will receive a comprehensive notebook covering the individual course presentations. You will also receive relevant Trane manuals, pending their availability from the publisher as of course date.

Learn About...
- Coil load and how to send it to the central plant
- Relationship of coil loads to chiller loads
- Cooling tower operation and maintenance
- Piping and pumping arrangements
- Pump startup, operation, and maintenance
- Heat recovery
- Thermal storage
- System controls

Key Benefits
Your participation will help you to:
- Efficiently load and operate a central plant with multiple chillers, towers, and pumps
- Understand the many simultaneous measurements necessary to obtain actual plant capacity data and adjust the plant or verify plant guaranteed capacity
- Improve the operation of an existing plant and logically expand or modify it

Who Should Attend
- Operators and related technical personnel responsible for operating central chilled water systems
- Plant design, consulting, and application engineers
- Mechanical contractors, field superintendents, site inspectors, and consultants with field inspection authority
- Manufacturers' representatives for central plant equipment

Not Included in Course
- Cooling load calculations
- Pipe sizing calculations
- Pump sizing calculations
(These are covered in other UW–Madison EPD courses.)

Course Instructors
Your instructors are all application engineers with expertise and knowledge to share in the areas of system selection, start-up, troubleshooting, and O&M.

Roy Ahlgren is a graduate of the US Naval Academy. During his career as a Naval officer, he was responsible for the operation and maintenance of a wide variety of shipboard engineering systems. Mr. Ahlgren has taught seminars in steam and water systems at ITT Bell & Gossett's famous "Little Red Schoolhouse" in Morton Grove, Illinois since 1985.

Daniel G. Dudley manages UW–Madison's Physical Plant, HVAC Engineering Section. His responsibilities include design review, maintenance and operations of more than 200 buildings, and a central steam and chilled water distribution system including two heating and cooling plants providing 850,000 lbm/hr of steam capacity and more than 18,000 tons of cooling capacity. Previously he held HVAC design, mechanical, and project engineering positions with Marshall Erdman and Associates, Affiliated Engineers, and Olsen and Associates.

Donald Eppelheimer is a senior application engineer for Trane Company products, especially chillers and related systems. He consults with owners and engineering firms in the United States and abroad on design and operation of central chiller plants.

Dave Schiffli, with Johnson Controls-York, has responsibilities including major retrofit activities to extend the useful life of existing equipment by changing refrigerant to non-ODP alternatives and by implementing modifications to improve unit efficiency and operability or eliminate component obsolescence. During the past 30 years he has worked with owners, and design and operating engineers on the selection and application of new equipment and O&M issues.

Robert D. Zeman has more than 30 years of experience with the Marley Cooling Tower Company, where he has held various sales and application engineering positions.

Exhibitors
Exhibitors are welcome to display product literature on available tabletop displays. The exhibit fee is $150.

ENROLL ONLINE TODAY! Or visit our Web site
Chilled Water Plant Operation and Maintenance
March 19–23, 2012 in Madison, Wisconsin

Course Outline

Monday, March 19
7:45 Registration and Continental Breakfast
The Pyle Center
702 Langdon Street
Madison, WI
8:00 Welcome and Introduction
Harold L. Olsen
Program Director
8:15 Central Chilled Water Plant Systems, Controls, and Operation
• What the chilled water plant is/does for you
• Possible component equipment items and arrangements
Cooling Coils
• How cooling coil selection and operation affect the central plant
• Coil types and circuiting arrangements
• Effect of variable flow
• Maintaining design DT for coils and plants
12:00 Lunch
1:00 Chillers
• Types available and possible reasons for their selection
  – centrifugal (single/dual)
  – screw (single/dual)
  – absorption
• Selections for minimum and maximum loads
• Parallel and series selection
Donald Eppelheimer
5:30 Adjourn

Tuesday, March 20
8:00 Piping
• Possible piping arrangements
  – chillers (series or parallel)
  – chillers and free cooling (from cooling tower heat exchanger)
  – chillers and thermal storage
  – chillers and heat recovery
  – chiller control/piping schemes for startup and operation
  – variable flow through evaporator
  – variable flow through condenser
  – low cooling tower water
  – primary-secondary vs. primary only (when/where)
  – front end/back end loading
Donald Eppelheimer
12:00 Lunch

Wednesday, March 21
8:00 Thermal Storage
• Reasons to consider ice thermal storage (unitary or central)
• Successful chiller-storage piping arrangements
• Operation and maintenance
• Example projects
12:00 Lunch
1:00 Control Systems for Plants with Multiple Chillers
• Why multiple chillers
  – symmetrical design
  – asymmetrical design
• Chilled water pump control
• Condenser water pump control
• Cooling tower control
• Variable speed drives: fans, pumps, chillers, towers
• Chiller sequencing
  – one chiller, one pump
  – two chillers, one pump: parallel/series chillers
  – two chillers, two pumps
• Primary/secondary
• Preferential loading: cogeneration, hybrid plant, free cooling, heat recovery, heat pump
• Chilled water reset
• Tower water reset
Donald Eppelheimer
5:30 Adjourn

Thursday, March 22
8:00 New Chiller Concepts
• Off-design performance
• Maximum capacity of chillers
Variable Speed Chillers and Their Fit in Single and Multiple Chiller Plants
• Variable water flow effects in the evaporator and condenser
• Refrigerant flow control for low flow
• Gas equipment concepts
• Understanding IPLV and NPLV ratings
Open Drive Chillers
• Electric motor drives
• Steam and gas turbine drives
• Gas engine drives
• Piping and operating a plant with chillers of various sizes and drives
Hybrid Plants
David Schiffli
12:00 Lunch
1:00 Cooling Towers
How Cooling Towers Work
• Heat transfer by convection, conduction, radiation, and evaporation
Tower Calculations Simplified
• Cooling range, approach, heat load, pump head, etc.
• Drift (windage), TD, bleedoff (blowdown), evaporation, makeup
• Determining cycles of concentration
• Determining makeup requirements
• Indoor water storage tank sizing
Cooling Tower Selection
• Tower components
• Factors affecting performance and rating
• Construction materials; type of fill
Tower Operations
• Free cooling
• Plume reduction methods
• Freeze protection/winter operation

Past Participants Say...

“Great course – highly recommended.”

“We are looking at expanding our facility, and the knowledge I got will help us make better decisions for our growth and development.”

“I really liked hearing the differences between the manufacturers!”

“Very good information and presentation.”

ENROLL ONLINE TODAY! Or visit our Web site
Four Easy Ways to Enroll

Internet: http://epd.engr.wisc.edu/webN113
Phone: 800-462-0876 or 608-262-1299 (TDD 265-2370)
Fax: 800-442-4214 or 608-265-3448

Mail to:
Engineering Registration
The Pyle Center, Dept. 106
702 Langdon Street
Madison, Wisconsin 53706

ENROLL ONLINE TODA Y!

Course Information

- Please enroll me in Chilled Water Plant Operation and Maintenance
  Course #N113 March 19–23, 2012 in Madison, WI  Fee: $1595

Team Discounts Available:
Call program director Harold Olsen, 608-262-2403, for details.

- I cannot attend at this time. Please send me brochures on future courses.

Personal Information (Please print clearly.)

Name ___________________________________________________________
Title ___________________________________________________________
Company _______________________________________________________
Address _______________________________________________________
City/State/Zip _______________________________ Phone (____) __________
Fax (____) ___________ E-mail ________________________________

Additional Enrollees

Name ___________________________________________________________
Title ___________________________________________________________
E-mail _________________________________________________________
Name _________________________________________________________
Title __________________________________________________________
E-mail _________________________________________________________

Billing Information

- Bill my company ________________________________ P.O. or check enclosed ________________________________ (Payable in U.S. funds to UW – Madison)

Card No. _______________ Cardholder’s Name ____________________________
Expires ___________________________

 UW# ____________________________ From mailer panel.

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Tower Water Treatment
- Blowdown
- Chemicals
- Filters
- Ozone

Upgrading Existing Cooling Towers
Robert D. Zeman

5:00 Adjourn

Friday, March 23

8:00 Introduction to the University of Wisconsin–Madison Central Chiller Plant and Site Tour (Optional)
- Chillers and drives
- Distribution piping/pumping
- Alterations, experiments: successes and failures
- Building tie-ins (piping arrangements)
- Tie-ins with other chillers

Site Tour: University of Wisconsin–Madison Chiller/Cogeneration Plant (optional)
Daniel G. Dudley

12:00 Final Adjournment
(Lunch on your own)

Partial List of Previously Enrolled Organizations
Abbott Labs
Berners-Schober Associates
Flanders Electric
General Motors
Grainger Company
HyClone Labs
ITT Corporation
Penn State University
Pfizer Inc.
Schering Plough
Stanley Consultants
The Stellar Group
University of Chicago
University of Michigan
University of Minnesota
University of Texas
US Army Corps of Engineers
US Department of Defense

Please Note: Daily schedules include continental breakfast, midmorning and midafternoon refreshment breaks, and noon lunch.

Need to Know More?
Call toll free 800-462-0876 and ask for
Program Director: Harold Olsen
Program Associate: Sandy Krentz
Or e-mail custserv@epd.engr.wisc.edu

General Information

Fee Covers Notebook, course materials, break refreshments, lunches, and certificate.
Cancellation If you cannot attend, please notify us by March 12, and we will refund your fee. Cancellations received after this date and no-shows are subject to a $150 administrative fee. You may enroll a substitute at any time before the course starts.
Location The Pyle Center, 702 Langdon Street, Madison, WI. Phone messages: 608-262-1122.
Accommodations We have reserved a block of guest rooms (rates starting at $89, including parking) for course participants at the Lowell Center, 610 Langdon Street, Madison, WI. Reserve a room online at epdweb.engr.wisc.edu/lodgingN113 or call 866-301-1753 or 608-256-2621. Room requests made later than February 20 will be subject to availability.
We have reserved a second block of guest rooms (rates starting at $89, including parking and Madison Taxi’s silver cab from the airport) for course participants at the Campus Inn, 601 Langdon Street, Madison, WI. Reserve a room online at epdweb.engr.wisc.edu/lodgingN113 or call 800-589-6285 or 608-257-4391 and indicate that you will be attending this course under group code 112853. Room requests made later than February 26 will be subject to availability.
Course Changes We reserve the right to alter the course schedule and substitute speakers when necessary. Your enrollment confirmation will include other hotel/motel information.
Earn Continuing Education Credits By participating in this course, you will earn 4.0 Continuing Education Units (CEU) or 40 Professional Development Hours (PDH).