

**AMERICAN SOCIETY OF HEATING REFRIGERATING AND  
AIR-CONDITIONING ENGINEERS INC.**

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**TC/TG/TRG MINUTES COVER SHEET**

(Minutes of all TC/TG/TRG Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/TRG NO.	TC6.1	DATE	March 10, 2012
TC/TG/TRG TITLE	Steam and Hydronic Systems		
DATE OF MEETING	January 24, 2012	LOCATION	Chicago, IL

MEMBERS PRESENT	YEAR APPT	MEMBERS ABSENT	YEAR APPT	EX-OFFICIO MEMBERS & ADDITIONAL PRESENT
Voting		Voting		
Ramex Afify	2011			John Dunlap
Jason Atkisson	2011			
Tricia Bruenn	2009			
John Glunt	2009			
Trevor Houck	2010			
Julia Keen	2010			
Ken Luther	2011			
Michael McDermott	2011			
Rex Scare	2011			
Steve Tredinnick	2009			
Edward Tsui	2011			
Corresponding		Corresponding		VISITORS PRESENT
Robert Bean	2005	Roy Ahlgren	2009	Bob Arentsen
Niels Bidstrup	2009	Raymond Albrecht	2002	John Azarias
David Bixby	1994	Steve Anthony	2011	Tom Davidson
Tom Cappellin	2010	Charles Arnold	2003	Mehdi Doura
William Coad	2007	Gil Avery	2006	Egils Dzelzitis
Kim Cross	2010	Peter Baade	2008	John Groom
Hooman Daneshmand	2011	Donald Bahnfleth	2006	Hans Hansen
Scott Fisher	2011	William Bahnfleth	2007	Chris Johnson
Mark Hegberg	2011	Albert Black	1987	David Kandel
Richard Hegberg	2010	Cyrus Blackmore	2007	Alexander Kelsen
Larry Konopacz	2008	Jeffrey Boldt	2010	Chris Kerback
Frank Myers	2007	Thomas Butcher	2010	Bhaskar Kompella
Tom Neill	2011	Michael Collarin	2010	Anthonie Lombard
Marc Neufcourt	2009	Kelly Cramm	2006	Rachael Mascolino
Reddy Palicharla	2011	Vikram Doshi	1996	Patrick Moyer
Donald Prather	2010	Fredric Goldner	2009	Lee Rocha
Earl Rightmier	2005	Farhad Golestan	2010	Paul Sohler

Mick Schwedler	2011	Wilbur Haag Jr.	1995	Justin Westmoreland
Bodh Subherwal	2010	Martha Hewett	2009	Aykut Yilmaz
Joseph Thuman	2007	Kevin Hoey	2003	
Greg Towsley	2009	Joseph Hoose	2005	
Robert Walker	2010	Chris Jacques	2010	
		Miha Kavcic	2007	
		Jack Kersten	1996	
		Trace Laux	2010	
		Evans Lizardos	2010	
		Thomas Logan	1996	
		Kenneth Magsam	2010	
		Zoltan Magyar	2005	
		Terrence Moses	2001	
		Mark Mueller	1999	
		Michael O'Rourke	2011	
		Drew Overmiller	2008	
		James Rishel	1987	
		Brent Ross	2005	
		Aniruddh Roy	2009	
		James Schlachter	2008	
		William Schulte	2011	
		Alexander Sleiman	2006	
		Alpdeniz Soysal	2011	
		Harvey Stenger	2010	
		Kevin Stuart	2010	
		David Tree	1999	

**All Members of TC/TG/TRG plus the following:**

TAC Section Head:	John Dunlap, PE
TAC Chair	Charles Culp, III
All Committee Liaisons as Shown on TC/TG/TRG Roster	ALI/PDC - John Nix, II
	Handbook Fundamentals – Forrest Yount
	Handbook Fundamentals – David Yuill, PE
	Research – Stephen Hancock
	Special Publications – William Fleming
	Standards – James Vallort
Manager of Standards	Stephanie Reiniche
Staff Liason/Research/Tech Services	Michael Vaughn

# MEETING MINUTES

TC 6.1 Hydronic and Steam Equipment and Systems  
Chicago, IL  
January 24, 2012

## 1. Call to Order:

Chair Keen called the meeting to order. The Chair welcomed all in attendance, and self-introductions were made. An attendance sheet was passed and signed by those in attendance. Secretary Walker called the roll of voting members. A quorum was present with 9 of 11 voting members present (2 voting member arrived late), including 1 non-quorum voting member..

**Technical Committee 6.1** is concerned with all aspects of hydronic and steam systems. This includes the application of boilers, chillers, terminal units, and all accessories and controls making up the total system as well as the design of the integrated system. In addition to comfort applications of both heating and cooling, snow melting systems are included. Cooperation with other TCs is recognized in areas such as control, noise and vibration, refrigeration, pumps and hydronic and service water piping.

## 2. Setting of the Agenda:

The Chair passed out an updated Agenda and there were no suggested revisions.

## 3. Approval of Las Vegas and Montreal Meeting Minutes

Motion by Rex Scare, seconded by Jason Atkinsson to approve the Las Vegas and Montreal minutes. Motion passed 8-0-0 with the Chair abstaining.

## 4. Section 6 Breakfast

Chair Keen summarized the key points of the Section 6 Breakfast. Items included the rebranding of ASHRAE; the Young Engineers Event; rating system for speakers at ASHRAE; and future meetings in San Antonio and Dallas.

## 5. Sub-Committee Reports

- A. Handbook: Rex Scare (Chair). Subcommittee meeting minutes of January 22, 2012, attached.
- B. Research: Tom Cappellin (Chair). Subcommittee meeting minutes of January 23, 2012, attached.
- C. Membership: John Glunt (Chair). Committee has 79 voting and corresponding members, the four provisional corresponding members are upgrade to corresponding members. Longtime committee member George Wallace recently passed away.:-

D. Standards: Mike O'Rourke (Chair) was absent.

Ken Luther updated the committee on the activities of 90.1. Revisions to the hydronic flow were passed unanimously at 90.1, without appropriate time for committee response. Luther recommends TC 6.1 take a proactive stance towards these revisions. Included in these revisions are the requirement for variable speed pumps on all applications and having the variable speed pumping control a function of the valve position and not pressure control with DDC Systems.

Ken Luther made a motion to form a working committee to organize the comments from TC 6.1 regarding the hydronic revisions and report them to 90.1, seconded by Steve Tredinnick. Motion passed 10-0-1 with the Chair abstaining. Chair Keen asked Ken Luther to chair this working committee

Standard SPC155P is voted out of committee for a summer vote. Still on-going issues with AHRI with tests indicating a need for revision.

Standard 55 – Thermal Comfort. This standard is in continuous maintenance with a user's guide out for bid.

who made these comments if Mike was absent?

Frank Myers reports that AHRI has requested 90.1 include a requirement for all boilers with a load of 1MBtu-5MBtu input have a 3:1 turndown; 5MBtu-10MBtu input have a 4:1 turndown; and boilers with an input above 10MBtu have a 5:1 turndown.

E. WEB Site: Jason Atkisson (Chair) Chair Atkisson indicated roster updates are now live on the subcommittee website. The logo update mandated by the ASHRAE rebranding is scheduled to be completed. Progress towards the Google Groups was abandoned. A secure FTP site was being investigated to review internal documents within the subcommittee.

F. Chilled Water Sub Committee : Steve Tredinnick (Chair). Subcommittee meeting minutes of January 22, 2012, attached.

Chair Tredinnick made a motion, seconded by Ramez Afify, to approve the proposed outline for a chilled water plant design chapter (attached) for submittal to ASHRAE for approval. Motion passed 10-0-1 with the Chair abstaining.

G. Programs: Mike McDermott (Chair). Subcommittee meeting minutes of January 23, 2012, attached.

Also, a look ahead to future programs (San Antonio, Dallas, Denver, and New York) is attached.

H. ALI. Greg Towsley (Chair): Chair Towsley reported two SDL courses are under revision. Scheduled for 1Q, 2012 is Fundamentals of Water System Design and 2Q, 2012 is Fundamental of Heating System Design, both contracted to Mark Hegberg. Chair Towsley asked for the support of TC 6.1 members in reviewing the course materials.

**6. Liason Reports.**

A. Section Head (John Dunlap). Dunlap discussed the ASHRAE rebranding and affirmed the on-going work of TC6.1.

**7. Approve/Disapprove Research Projects**

No Action required.

**8. Old Business:**

No old business to conduct.

**9. New Business/Industry Update**

A. Robert Bean brought the original System Syzer, designed by Gil Carlson. Bean reports the original System Syzer will be donated to the ASHRAE archives. The Honors and Awards Subcommittee is developing an engineering humanitarian award, to be named the Carlson-Holohan Award with a plaque being given to the recipient.

**10. Meeting Adjournment:**

A motion was made by Ken Luther to adjourn the meeting, seconded by Mike McDermott, the motion passed 10-0-1, with the Chair abstaining.. The meeting was adjourned at 3:35pm.

Submitted by,  
Bob Walker.  
TC 6.1 Secretary

## TC6.1 Handbook Subcommittee Meeting Minutes 1/22/2012

### Attendees:

Rex Scare  
Niels Bidstrup  
Bob Walker  
Scott Fisher  
Forrest Yount  
Thomas Neill  
Hooman Daneshmand  
Hans Hansen  
Tricia Bruenn  
Jason Atkinson  
Steve Tredinnick  
Julia Keen  
Ramez Afify  
Mick Schwedler

- Montreal minutes approved – Motion by Julia Keen, 2<sup>nd</sup> by Steve Tredinnick....motion carried.
- Discussed the request for adding a formula for chilled water volume calculations. Handbook members did not see value in adding a secondary formula. This secondary formula would not save the user much time and would only get the user within 10% of actuals. Motion by Julia Keen, 2<sup>nd</sup> by Bob Walker to not include the suggested calculation to the handbook. Motion carried.
- We will be combining Chapter 45 of Systems(Pipes/tubes/fittings) with Chapter 22 of Fundamentals (Pipe Sizing) – No report on status (Rex to contact Al Black for update).
- Chapters 12 and 45 of Systems had not been voted on by TC, so there will be no changes in the 2012 Systems handbook for these chapters.
- Chapter 12 and 45 of Systems will reviewed in the near future and then submitted to TC for vote. After approval by TC will be submitted to ASHRAE to update the online version of the handbook. (Julia to contact Mark Hegberg to get current suggested changes)
- Chapters 14, 35, 43, and 45 of Systems will be submitted on January 22, 2012.
- ASHRAE has added Handbook Online Plus which will allow for usable spreadsheets, videos, etc.
- All future handbook revisions should include the following:
  - At least one practical design example
  - Sustainability example and/or calculation
  - Ask international members for input from their perspective.
- Meeting adjourned at 6:05 pm

## ASHRAE TC 6.1 “Hydronic and Steam Heating Equipment and Systems”

Research Subcommittee Report – Monday, January 23, 2012

Thomas E. Cappellin, Chair

1. Mark Hegberg needs to update two RTARS he has been composing so they are in compliance with RAC’s current submittal requirements. The current titles are:
  - a. “Copper Tube Fitting Flow Factors and the Hydronic Coil Characteristics Modeling”
  - b. “Allowance for Aging in Steel and Iron Pipe”

These titles are subject to change as the RTARS are updated.

2. Scott Fisher will prepare a new RTAR based on qualifying stress forces when designing and applying pipe anchors for pipe expansion sections.
3. TC 6.1 sponsored a Research Project based on pressure drop coefficients of plastic piping fittings. This project was undertaken by Professor William Rahmeyer of Utah State University and his findings were submitted to ASHRAE and presented to a past TC 6.1 Committee. The final report will be resurrected and placed into TC 6.1’s records for future reference.
4. TC 6.1 needs to develop an RTAR dealing with pressure losses that occur in copper and stainless steel pipe press fittings. An author needs to be found for this endeavor.
5. Research Subcommittee Chairs Breakfast Highlighted the following topics:

- a. Drury Crawley was presented with the “Service to ASHRAE Research” award.
- b. The GPIC (Greater Philadelphia Innovation Cluster for Energy Efficient Buildings” has been established by USDOE to focus on full-spectrum retrofit of average size commercial, multi-unit residential, and mixed (commercial and multi-unit residential) buildings. GPIC is provided with support by Penn State University.

The location for the GPIC is the 1,200 acre Naval Shipyard in Philadelphia which includes 270 existing and new buildings that can be utilized as test beds, and an independent unregulated micro-grid.

GPIC’s goals are to transform the delivery process of the building retrofit industry in the Greater Philadelphia Region from a serial fragmentation to an integrated product design and delivery method that optimizes whole building system efficiency and performance.

This requires:

- Improving system design tools.
- Integrated building component and subsystem technologies.
- Supportive public policies and market and behavioral incentives.
- Customer value propositions focused on systems performance benefits.
- Business models that quantify profits realized by the integrated system approach.
- A skilled workforce to insure optimal performance of integrated subsystems.

The GPIC has established an “Opportunity Research Fund” (ORF) that includes the following funds:

- About \$10 million over five years allocated for ORF.

- Grants of between \$100,000 and \$250,000 to support research, development, demonstration, and deployment of technologies, policies, business models, and training programs that advance GPIC goals.
  - Primary proposal evaluation criteria: Degree to which ORF funding is critical in advancing an opportunity to wide scale deployment.
  - Teams must include at least one of the 24 GPIC member organizations and must include at least one non-member organization.
  - Seven projects awarded in 2011 totaling \$1.3 million of DOE funding.
  - Two ORF RFPs will be issued in spring of 2012 and summer of 2012.
  - Michael Vaughn will be notified when each RFP issues and will inform TC Research Chairs.
  - See [www.gpichub.org](http://www.gpichub.org) or meet Rich Sweetser who is the GPIC consultant in RAC.
- c. Grants-In-Aid:
- A letter announcing the availability of ASHRAE Grants-in-Aid for Graduate students was sent to over 300 colleges in October, 2011.
  - 65 candidates applied for a grant and will be evaluated by the Research Planning Subcommittee at the Winter Meeting. There were 66 applicants during the previous year.
- d. New Investigator Award:
- Five new researchers have been nominated for the award.
  - The Research Planning Subcommittee will review the applications at the Winter Meeting for the Society year 2011-2012.
- e. Current Projects:
- The 2011-2012 fiscal year began with 71 projects under contract.
  - 16 projects have been completed.
  - Of the 71 active projects under contract, 12 are currently being evaluated to determine if they can be closed.
- f. Research Funding Status:
- 10 Tentative Research Projects were released for bid in fall, 2011.
  - 5 Work Statements approved “on-hold” or “pending” are ready for bid or rebid in spring, 2012 provide sufficient funding is available.
- g. Unsolicited Research Proposals:
- 5 URP’s will be discussed by the reviewing TC/TG/SSPCs and will be considered by the RAC and Tech. Council in Chicago if recommended for funding by TC/TG/SSPCs.
- RAC received an unusual number (5) of URP’s.
  - Some PI’s and TC’s may consider this as shortcut.
  - However, this URP route is considered only acceptable in exceptional cases.
  - RAC may clarify in more detail what may be considered as exceptional.



- h. Research Implementation Plan:
  - The Society Research Implementation plan currently consists of 53 research topics in various stages of development prior to contract award (23 RTARS; 14WS's; and 16 TRPs).
  - There were 64 topics at this time in the previous year.
- i. TC's are encouraged to produce more Projects:
  - The current number of RTARs (6) and WS (2) for RAC to evaluate is quite low which may cause a shortage of promising research projects in the near future.
  - It takes between 1-2 years before a Work Statement (WS) is accepted, and a Tentative Research Proposal (TRP) is ready for bidding.
  - If ASHRAE does not receive enough proposals during 2012/2013 it will run out of projects.
- j. New RTAR Coversheet:
  - A new coversheet has been issued and is available from ASHRAE's website. It has an improved layout and easy to fill in the word template.

## TC 6.1 Chilled Water Plant Sub-Committee Meeting

Winter Meeting, Chicago, IL January 22, 2012

Submitted by Steve Tredinnick

14 Attendees: Steve Tredinnick, Tricia Bruenn, Bob Walker, Scott Fisher, Tom Neill, Hooman Deneshmand, Mick Schwedler, Rex Scare, Julia Keen, Edward Tsui, Hans Hansen, Biels Bidstrup, Ramez Afify, Jason Atkisson

### Topics Discussed:

Only one topic discussed and that was the pursuit of a new Handbook chapter to assist young engineers in designing a chilled water plant. A proposed outline was handed out (see attached) and discussed.

Then intent is to add an individual that would lead the effort on one of the section topics and also have several task members under them to help.

Looking for additional “volunteers” Steve Tredinnick attended TC 8.2’s (Centrifugal Machines) committee main meeting and informed them of the potential new chapter and asked for any volunteers or suggestions. Follow-ups will be made to Steve Duda and Fred Betz.

Steve also reached out to a voting member of TC 8.6 Cooling Towers for assistance. The outline was forwarded to Rus Lindemann.

Steve requested that the TC vote on approval of the outline of the supplement so he could forward on to Mark Owen at Headquarters for Society approval. Ken Luther wanted to add the chiller plant siting to the concept design discussion.

Steve Tredinnick made the above motion, and Ramez Afify seconded. The TC voted with 10 for, 0 against and 1 abstentions with Chairman not voting.

## TC 6.1 Chilled Water Plant Sub-Committee - Chicago 2012 Winter Meeting

January 22, 2012 (last revised June 28, 2010)

Outline for New ASHRAE Chilled Water Plant Design Chapter for Systems Handbook

*It is recognized that this may have overlap with existing handbook chapter materials. It is intended to use all existing information as background references for this new chapter. Original hope was to use material from district cooling design guide being prepared by TC 6.2 1297-RP.*

Chapter Topic	Chapter Leader	Task Volunteer
<p><b>Scope and Purpose of Chapter</b></p> <p style="color: red;">To create a chapter that walks the design engineer step by step through the process of selecting and sizing equipment in a chiller plant. Identified size range is between 150 and 2000 tons that could have single or multiple chillers mostly focusing on water cooled plants.</p> <p style="color: red;">Use ASHRAE HQ building as an example (floor plans and potentially load profile) [ask Julia Keen to obtain from HQ]</p> <p style="color: red;">Analyze Air cooled vs. water cooled economically</p> <p style="color: red;">Present Good, Better, Best (what is the minimum design)??</p>		
<p><b>Conceptual System Planning</b></p> <p>Design Temperature Selection – existing, new</p> <p>System Design Pressures and materials</p> <p>Spatial Planning – where are things going, maintenance requirements, mono rail, over head crane rails, davits, etc.              Implications of Thermal Storage on spatial requirements or equipment selection</p> <p>Plant layout – maintenance requirements, future requirements</p> <p>Plant architectural issues              Acoustics, vibration, aesthetics, coordination with architect, fire walls and ratings, louvers, roof penetrations, etc.</p> <p>Load Definition – what is the max and the min – use ASHRAE HQ              Sizing for future requirements</p> <p>Investigation into utilities and costs</p> <p>Sizing Chillers per Load Profiles – peak day and annual  <span style="color: red;">Procurement?</span></p> <p>Redundancy</p> <p>Diversity</p>	Tredinnick	<p>Schwedler</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>Schwedler</p> <p>Schwedler</p> <p>Schwedler</p> <p>X</p> <p>Schwedler</p> <p>Schwedler</p>
<p><b>Chillers</b></p> <p>Chiller Technologies – centrifugal, screw, absorption, etc. Research how this interfaces with existing chapters on chiller technology (<i>do we get into air-cooled chiller plants?</i>)</p> <p>Refrigerants – HFC, HCFC, Li-Br, ammonia, propane, etc. (ASHRAE Standard 34)</p> <p>Prime Drivers – electric, steam, engine, variable frequency drives              When to use and how to calculate the economics</p> <p>Open Drive &amp; Hermetic</p> <p>Magnetic Oil-less Compressors drives</p> <p>Chiller configuration – parallel, series, series-counterflow, piggyback, heat recovery, templiers, ground source heat rejection (heat pump),</p>	Tredinnick	<p>Schwedler</p> <p>Schwedler</p> <p>Tredinnick</p> <p>X</p> <p>X</p> <p>Schwedler</p>

Chapter Topic	Chapter Leader	Task Volunteer
etc. Accessories – marine water boxes, RTDs, VFDs, davits, etc. Operational Limitations – low and high end conditions when varying flow		X Schwedler
<b>Evaporator</b> Water temperatures and impact on system efficiencies Tube Materials Number of Passes When to use Marine water boxes?	Tredinnick	Schwedler
<b>Condenser</b> Water temperatures and impact on system efficiencies Tube Materials Number of Passes When to use Marine water boxes?	Tredinnick	Schwedler
<b>Heat Rejection</b> <i>Air Cooled?</i> Water Cooled Open Circuits Cooling Towers and Hybrid Towers Surface Water – River water, lake water and Seawater Reclaimed water impact Closed Circuits Ground water – wells Air Cooled Radiators? Refrigerant Circuits Evaporative Condensers  Use of heat pumps, templiers and recovery of heat	X	X X  X  X  X
<b>Pump Selection</b> Configurations – manifolded pumps vs. individual chiller pumps Pumping Schemes Primary only Variable Flow Primary Primary Secondary (constant/variable) Pump head calculation and impact to sizing Voltage limitation (480V or 4160V)		Neils Bidstrup Schwedler
<i>Control Theories?</i> <i>Sample Sequences</i>	Edward Tsui	
<b>System Issues</b> Minimum Water Volume Plants with Multiple Chillers – pressure drops, start/stop <i>System Optimization?</i> Low Delta T Syndrome impact on plant Free Cooling – parallel and series Water Treatment and conservation Filtration requirements and options Startup and Commissioning	X	Schwedler Schwedler Schwedler Schwedler X X X

Chapter Topic	Chapter Leader	Task Volunteer
Long term operational and maintenance requirements		X
<b>Codes, Standards and Guidelines regarding High Performance and Safety</b> Plant Efficiency Minimum energy requirements per ASHRAE 90.1 Chillers, pumps, cooling towers, VFDs, controls, etc. Heat reclamation Guideline 22 Standard 189 Chiller Testing – Factory and Field – ARI Standard 550/590 LEED Credit Plant Safety Chiller Room Ventilation Standards (ASHRAE Standard 15)	Julia Keen	X Schwedler  X X X Schwedler X Schwedler
<b>QUESTIONS:</b> <ul style="list-style-type: none"> <li>• <i>Is the ASHRAE HQ load information available in eQuest or Trane Trace????</i></li> <li>• <i>Confirm overlap with other Chapters</i></li> <li>• <i>Recruit authors from vendors?</i></li> </ul> <b>ACTIONS:</b> <i>Steve T to forward TC approved and final Outline to Mike Owen and Rus Lindemann</i> Meet TC 8.2 (centrifugal machines) & TC8.6 (cooling towers)		
Topics to leave out that are covered well elsewhere in Handbook: <ul style="list-style-type: none"> <li>• Thermal storage</li> <li>• Expansion tank sizing</li> <li>• Control valves</li> </ul>		

**CHICAGO MEETING MINUTES**  
**PROGRAMS SUBCOMMITTEE**  
**ASHRAE TC 6.1 “HYDRONICS AND STEAM HEATING EQUIPMENT AND SYSTEMS”**

A. Meeting called to order at 2:15 pm, 23 Jan 2012 at Palmer House, by Mike McDermott

B. Members and Visitors in attendance

	Name	Position
1.	Mike McDermott	Programs Subcommittee Chair
2.	Julia Keen	Chair
3.	Rex Scare	Member
4.	Ken Luther	Member
5.	Niels Bidstrup	Member
6.	Scott Fisher	Corresponding Member
7.	Tricia M. Bruenn	Vice Chair
8.	Bob Walker	Secretary
9.	Rex Scare	Handbook Committee Chair
10.	Tom Cappellin	Research Subcommittee Chair
11.	Greg Towsley	ALI Coordinator
12.	Jason Atkisson	Web Master
13.	Edward Tsui	Corresponding Member
14.	Hooman Daneshmand	Corresponding Member
15.	Ramez Afify	Member
16.	Joseph Thuman	Corresponding Member
17.	Hans Hanson	Member

C. Current and future programs were discussed.

1. We have three (3) programs that will be presented in Chicago:
  - a. Modeling to Improve DHW and Hydronic Systems
  - b. A New Analysis of Pressure dependent Control Valves
  - c. Pipe Anchor Forces
2. Feedback from CEC (Mike and Julia) on rejected programs
  - a. Std 90 and Hydronics System Update – Did not align in HPB track – We will resubmit under Standards Track in Dallas
  - b. Steam Basics - Did not rank high enough when compared with programs in Fundamentals Track – We will resubmit in New York
3. See attached look ahead spread sheet for future programs.
4. For detailed information on how the above programs as to be assembled and submitted visit ASHRAE's web site for information and direction.

D. Adjournment of subcommittee at 4:15 pm.

**TC -6.1 Programs Look Ahead - Chicago 2012 Meeting**

<b>Year</b>	<b>2012</b>	<b>2013</b>	<b>2013</b>	<b>2014</b>
<b>Date</b>	June 25-29	Jan 21-25	June 23-27	Jan 21-25
<b>City</b>	San Antonio	Dallas	Denver	New York
<b>Tracks</b>	<a href="http://www.ashrae.org/sanantonio/">www.ashrae.org/sanantonio/</a>	<a href="http://www.ashrae.org/dallas/">www.ashrae.org/dallas/</a>	<a href="http://www.ashare.org/denver/">www.ashare.org/denver/</a>	<a href="http://www.ashare.org/newyork/">www.ashare.org/newyork/</a>
1	HVAC & R Systems and Equipment	HVAC & R Systems and Equipment	HVAC & R Systems and Equipment	HVAC & R Systems and Equipment
2	HVAC & R Fundamentals and Applications	HVAC & R Fundamentals and Applications	HVAC & R Fundamentals and Applications	HVAC & R Fundamentals and Applications
3	Integrtaed Energy Systems	ASHRAE Standards		
4	Building Modeling			
5	Refrigeration Applications			
6	Indoor Environmental Application			
7	Integrtaed Building Controls			
<b>Technical Paper</b>	Paper: September 26, 2011	Paper: April 16, 2012 Bypass Orifice Testing - U of K - Greg	Paper: September 17, 2012	Paper: April 18, 2013
<b>Conference Paper</b>	Abstract: Oct. 9, 2011; Paper: Jan. 9, 2011	Abstract: March 19, 2012; Paper: July 9, 2012	Abstract: Oct. 9, 2011; Paper: Jan. 9, 2012 (Tentative)	Abstract: Oct. 9, 2011; Paper: Jan. 9, 2013 (Tentative)
<b>Seminar</b>	Proposal: February 13, 2012  Boiler, Valve and Pump Selection - Trica	Proposal: August 13, 2012 Pressure Independent Control Valve Basic Design Applications -Bob/Ken/Hooman ASHRAE Stds and Hydronic Design - Jason Building Accessments of Hydronic Systems- Greg	Proposal: February 14, 2013  DDC and Hydronics Interface- Ken Chilled Beam Hydronic Design - Ken Hydronic Systems for Data Centers - Hooman	Proposal: August 13, 2013  Steam Basics - Rex Steam Applications - Jason Chiller Plant Contol Optimization - Ed
<b>Forum</b>	Proposal: Febuary 13, 2012 Std 90 Update on Chiller Plant Pump Control - Ken Pressure Independent Control Valves - Bob/Hooman Chiller Plant Design Handbook Chapter - Jason	Proposal: August 13, 2012 DDC and Hydronics Interface-Ken Chilled Beam Hydronic Design - Ken Hydronic Systems for Data Centers - Hooman	Proposal: February 14, 2013 Are we Done with Steam?- Mike and Bill Chiller Plant Contol Optimization - Ed	Proposal: August 13, 2013