

DRAFT - MINUTES January 31, 2017
AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS, INC.
 1791 Tullie Circle NE
 Atlanta, GA 30329
 404-636-8400

TC/TG/TRG MINUTES COVER SHEET

(Minutes of all meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/TRG No. 6.8 Date 2017

TC/TG/TRG TITLE: Geothermal Heat Pump and Energy Recovery Applications

DATE OF MEETING: January 31, 2017 LOCATION: Las Vegas, NV

Members Present	Year APPTD	MEMBERS ABSENT	Year APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Chris Gray (Chair)	16-18	Scott Hackel (Vice)	16-20	<u>Corresponding Members</u>
Mike Kuk (sect)	16-19	Shaojie Wang	16-20	Dee Brower
John (Mike) Filler (handbook chair)	16-19	Bruce Baccei (member non quorum)	16-20	Pat Dempsey
Xiaobing Liu (Research Chair)	16-18	Ed Lohrenz (member non quorum)	16-20	Mike Green
Lisa Meline (standards chair)	14-16	(2Voting, 2 NQ)		Duane Harman
Kay Thrasher (ali coordinator)	16-20			Dave Haller
Warrant (Trey) Austin	14-18			Carl Huber
Michel Bernier	14-18			Chuck High
Stephen Hamstra	14-18			Piljae Im
Stephen Kavanaugh	14-17			Robert Koskka
William Murphy	16-20			Dennis Koop (webmaster)
Howard Newton	14-18			Carl Orio
(12 Voting)				Gary Phtetteplace
				Tim Roos
				Harrison Skye (sub committee chair)
				Cary Smith (memshp ch)
				Keith Swilley
				Jeff Spittler
				Chris Stone
				Jeremy Fauber
				Stephen Wage
				Jorgen Wallin
				(21)
				<u>Guests</u>
				Brendon Hill
				Akio Miyara
				Don Penn
				Rashan Reveular
				Akos Reves
				Michael Sammut
				Art Sutherland
				Ian Welle
				Metkel Yebiya
				(9)

DISTRIBUTION - ALL MEMBERS OF TC/TG/TRG

TAC Chairman: _____ Walter Grondzik

TAC Section Head: _____ Mark Hegberg

ALI/PDC: _____ Hugh McMillan, III

LIAISONS

RAC Research: _____ Stephen Hancock

Chapter Technology Transfer Committee: _____ Maggie Moninski

Special Publications: _____ Francis Mills

Standards: _____ Cyrus Nasser

Handbook: _____ Patrick Marks

MANAGER OF RESEARCH/TECHNICAL SERVICES: _____ Michael Vaughn

MANAGER OF STANDARDS: _____ Stephanie Reiniche



MINUTES

Pursuant to an announcement sent to all members, ASHRAE Technical Committee TC 6.8, *Geothermal Heat Pump and Energy Recovery Applications*, met on Tuesday, January 31, 2017 at 3:30 PM in Las Vegas, NV. The meeting was held in conjunction with the ASHRAE 2017 Winter Meeting.

I. CALL TO ORDER, WELCOME, INTRODUCTIONS

Chair Chris Gray called the meeting to order at 3:35 PM. The Chair welcomed everyone. Members, guests, and ASHRAE Committee liaisons were requested that they introduce themselves. The importance of YEA was noted. Five YEA members were in attendance. The Chair requested that the sign-in sheet be filled out completely, and that attendees check their information on the roster sheet and make any changes through ASHRAE's website.

II. QUORUM CHECK

More than fifty percent of the voting members of the technical committee, present in person, constitute a quorum for the transaction of business. The roll call revealed that twelve (12) of fourteen (14) Quorum members of the technical committee were present. A quorum was available to conduct committee business. Two non-quorum members were not in attendance.

III. SPECIAL ANNOUNCEMENT

No special announcements

IV. APPROVAL OF MINUTES

The Secretary distributed copies of the minutes of the June 28, 2016 Annual Meeting in St. Louis, MO and the Chair requested that members review them.

MOTION: Lisa Meline moved that the Minutes of the TC 6.08 meeting in June 2016 be accepted as presented with some changes to naming, and the motion was seconded by Dr. Kavanaugh. The Motion carried and the minutes were approved (12-0-0-CNV).

V. ANNOUNCEMENTS FROM ASHRAE

A. No announcements from ASHRAE

VI. ANNOUNCEMENTS FROM THE CHAIR

- a. Chair presented award recipients and other announcements (get copy of the update he got)
- b. There is a new website template. Looking for feedback.
- c. New manual on TC procedures will be after this meeting.
- d. Seminar and Forum are due Monday.
- e. Review ASHRAE code of Ethics
- f. RAC is prioritizing research topics related to the residential sector

VII. SUBCOMMITTEE REPORTS



- A. KTM Award:** Lisa Meline Presented the name of the first winner. No longer confined to region 6. Passed out the requirements.
- B. Handbook - Dr. Harrison Skye, Mike Filler**
- i. Geothermal: Harrison Skye presented minutes from sub-committee meeting (see attachment)
 - ii. Heat recovery: Mike Filler presented results from sub-committee meeting
 1. Chpt 9 early in planning stage of 2010, wants to get a list of volunteers.
- C. Standards – Lisa Meline**
- i. Standard 194 went out for review. Only one comment back. Going to next step. (method of test)
 - ii. ANSI/CSA C448 Series 16- design and installation of GSHP system for commercial/residential buildings was published
 - iii. Uniform Solar Energy and Hydronics Code is working through its next revision.
 - iv. No movement on ASTM E4415
 - v. Cary talked on IAMPO committee. In march will see comments.
- D. Membership-Cary Smith**
- i. Rolling Over Steve Hamstra, Dr. Kavanaugh rolling off. Cary will roll on, and one other (unnamed) has requested to roll on. This will be for the 2017-2018 year. Call for corresponding members.
- E. Website-Dennis Koop**
- i. Follows ASHRAE format. Call for anything like to add. Wants to add info on the Kirk Mescher Award.
 - ii. Discussion: Chair asked if can track the website. Hard to find sub-committee websites online ASHRAE. Google search best way. ASHRAE has updated security recently. If haven't logged on recently to check aliases. May want to check, because may not work.
- F. Programs - Michael Kuk** - subcommittee meeting was held on January 29
- a. Presented minutes from sub-committee meeting (see attachment)
 - i. St. Louis had one seminar, and two conference papers related to GSHP
 - ii. Las Vegas had two seminars and 1 CPS
 - iii. Next meeting Long Beach: Seminar, forum, workshop proposals due Feb. 6th.
 - iv. Chicago meeting, do not have timelines yet
 - b. Additional Discussion
 - i. Bill Murphy volunteered to chair net zero seminar. Will reach out to two speakers discussed (Benny Skelton, Scott Hackel)
 - ii. Larry Konopacz agreed to chair "Pairing Energy Efficient Geothermal and hydronic systems in residential buildings"
 - iii. Kuk will reach out to Parham Eslaminejad / Van Blaster who was interested in a seminar on DX GSHP
- G. Research - Xiaobing Liu** - subcommittee meeting was held January 229
- i. Called for authors for an RTAR on Heat Exchanger Design. Call to our members to get names of someone they know who might want to promote new heat exchanger designs.



- ii. MTG discussion (ask Xiaobing for example)
- iii. Motion to accept the full project with the added information to RP1385
 - 1. Xiaobing motion, Lisa second
 - 2. 11 yea, 0 opposed. Not vote 2 (2 members non-quorum) Abstained:
Chair

H. Education and Special Publications/Journal - Position Vacant

- a. No report given.

VIII. LIAISON REPORTS

A. ALI COORDINATOR – David Pleasants

- a. No report.

B. NGWA – Cary Smith

- a. Formed a panel on ground water safety. Looking for papers.

C. IGSHPA – Cary Smith

- a. There has been a move to look at tax benefits of accelerated depreciation to get us back to within 60% of where were before tax credits disappeared.

D. Geo- Keith Swilley

- a. Tax credits are NOT dead, but unknown what will happen with new administration. Legislative visit planned March. RAC

E. IATMO – Lisa Meline

- a. ANSI/CSA 448 is going through its next revision cycle

IX. OLD BUSINESS

X. NEW BUSINESS

- a. Xiaobing: Innovation study on Geo being done at DOE. What is the future of Geo. He is calling for help from our TC. IE: How much can efficiency be increased, how much can costs be reduced? Needs to predict the future. Patrick Dempsy: discussed he had price information available.

XI. ADJOURN

- A. MOTION to adjourn the meeting. Stephen Hamstra moved, Lisa Meline seconded. Motion carried (12-0-0-CNV).**

Nine pages of attachments follow:

1. Committee Assignments
2. Program Subcommittee Report
3. Handbook Subcommittee Report
4. Standards Subcommittee Report
5. ASHRAE Meeting Report



Committee Assignments (2017)

Programs:

M. Kuk (chair)
L. Meline
C. Smith
K. Thrasher
F. Pucciano
J. Spitler

Research

X. Liu (chair)
G. Phetteplace
D. Dinse
S. Hackel
B. Koschka
C. Remund
Stephen Hamstra
Mike Filler

Handbook Ch. 9: Heat Recovery

M. Filler (chair)
C. Paraskevacos
E. Lohrenz
F. Pucciano
G. Phetteplace
C. Haynes

Handbook Ch. 34: Geothermal

H. Skye (Chair)
J. Fauber
M. Bernier
A. Chiasson
M. Green
M. Kuk
X. Liu
K. Rafferty
C. Smith

TC 6.8 Geothermal Heat Pump and Energy Recovery Applications

- 1) **St. Louis Meeting:** We had one sponsored seminar, and two conference paper session related to geothermal.
- 2) **Las Vegas Meeting:** 2 meeting

Saving Water (and Energy) with Solid Geothermal Design and Operation

Track: Water-Energy Nexus

Seminar 41, 9:41-11:00, Tuesday Jan. 31

Room: Augustus I/II

Sponsor: 6.8 Geothermal Heat Pump and Energy Recovery Applications

Chair: Cary Smith, Sound Geothermal Corp., Sandy, UT

Geothermal heat pump systems have long been known as a leading system choice for energy performance. But in many regions of the world, geothermal is also the best choice for saving water, as it avoids significant operation and water usage from cooling towers used in those regions. Hybrid systems are also sometimes operated with both geothermal loops and cooling towers; these can be operated optimally to save both energy and water.

1. The Energy-Water Highway: Getting the Least Use from Evaporative Devices

Cary Smith, Member, Sound Geothermal Corp., Sandy, UT

Cooling towers used by water source systems can consume up to 50% of a site's potable water. Owners and design-professionals must cut down on CTs that reject waste heat for space cooling by the power of evaporation. Towers consume water, chemicals, and lots of electricity; producing wastewater unqualified to pass through treatment plants. Can anything take their place? YES! Distributed GSHP systems provide thermal leverage on reduced power demand; reducing cooling tower water wastage by 50% - 70% and electric consumption by 60%. Explore how a GX-based Distributed Energy System enables solutions to Energy/Water Nexus challenges.

2. Water Wizards and Water Wasters: Geothermal Exchange Replaces Cooling Towers

Jay Egg, Egg Geothermal, Kissimmee, FL

This presentation focuses on a geothermal sourced chiller plant in Florida, and a distributed geothermal heat pump installation near Los Angeles, both in operation for several years, originally slated for cooling towers. Attendees will see in both cases the methodology and rationale by which architects, engineers and owners worked together to choose to eliminate their cooling towers, and reaping remarkable water savings along with energy savings and an array of other tangent benefits.

3. Managing Water in Las Vegas: Keeping the Cats Clean and Cool

Jerry Zupancic, Cashman Equipment, Henderson, NV

With the ever changing climate we are experiencing in the world, Cashman Equipment is doing their part to conserve water and energy by using a Geo-Thermal system to cool their corporate facilities. They are using 30% less water than conventional systems utilizing two (2) 250 ton cooling towers as a supplemental cooling to the loop used by the heat pumps. The original calculations showed an approximate savings of \$46,000.00 over the conventional DX cooling. Yes, as hot as Las Vegas is, we are running efficiently with massive well field below the desert heat.

Sewage Water Heat Pump Systems: Recovering Heat, Cold and Water

Track: Water-Energy Nexus

Seminar 58, 11:15-12:45, Tuesday January 31

Room: Augustus V/VI

Sponsor: 6.8 Geothermal Heat Pump and Energy Recovery Applications

Chair: Jeffrey Spitler, Ph.D., P.E., Oklahoma State University, Stillwater, OK

Sewage water represents an enormous, yet largely untapped resource, that could be used as a heat source and sink for heat pumps providing heating, cooling and hot water to buildings. This seminar presents recent research, development and a project case study of a sewage water heat pump system at the Denver Museum of Nature and Science. This system also processes sewage water on site for non-potable uses.

1. Waste Water Heat Recovery with Heat Pumps: Possibilities and Experiences

Jörgen Wallin, Ph.D., KTH (Royal Institute of Technology), Stockholm, Sweden

Interest in waste water heat recovery in the residential and commercial sectors has increased significantly in recent years. Integration of heat pumps with these systems introduces the possibility to use the recovered heat freely. However, integration of heat pumps also makes these systems more complicated. For the system designer, this means that knowledge regarding the influence of design parameters on the system performance over both the short- and long term is needed. This seminar presentation looks into how different parameters influence the system performance when using heat pumps; a few examples of heat exchangers are also introduced.

2. Recycling Water and Energy at the Denver Museum of Nature and Science, Part 1: System Design

Trey Austin, P.E., Member, Geo-Energy Services, Littleton, CO

Today's evolving market for GeoExchange systems continues to develop solutions that are compatible with large buildings in urbanized areas where site areas for a traditional ground heat exchanger are extremely limited. For both new construction and retrofit situations, alternatives to a ground loop may exist such as waste water systems that recycle non-potable water. In fact, there are over 3500 municipalities with some level of recycled water distribution networks. These untapped resources offer both viable performance solutions and higher potential installation and operation cost savings. This presentation covers such a system at the Denver Museum of Nature & Science.

3. Recycling Water and Energy at the Denver Museum of Nature and Science, Part 2: System Performance

Piljae Im, Ph.D., Member, Oak Ridge National Laboratory, Oak Ridge, TN

This presentation highlights the findings of a case study of a recycled water heat pump (RWHP) system installed at the Denver Museum of Nature and Science in Denver, Colorado. The RWHP system utilizes the recycled water from the City's water system as the heat sink and source for the heat pump. This case study is based on the analysis of measured performance data, maintenance records, construction costs, and engineering calculation of the energy consumption of conventional central heating, ventilation, and air-conditioning (HVAC) systems providing the same level of space conditioning as the demonstrated RWHP system.

3) Recent rejected sessions:

- a. (Las Vegas) Borehole Thermal Energy Storage: Had speakers from four nations. Chair Michel Bernier
- b. (Chicago) Workshop: Calculating Hydrostatic head/ selection of grout materials: Chair: Cary Smith
- c. (Chicago) Forum: EPA 111D (Carbon Reduction) "What impact will this act have on energy efficient design?" Chair: Chris Gray
- d. (Atlanta): How to design ultra-deep boreholes –avoiding pipe collapse (Submitted by Cary)

4) Next Meeting Location(s)

Annual 2017- June 24-28, 2017 - Long Beach, CA

Winter 2018-Jan. 20-24, 2018 - Chicago, IL

Key next Dates:

Long Beach

~~8/29/16: Conference Paper Abstracts and Tech Papers Due~~

~~9/9/16: Conference Paper Abstract Notifications Due~~

~~12/9/16: Final Conference Papers Submitted for Review~~

~~1/2/17: Website opens for Seminar Forum and workshop proposals~~

~~1/16/17: Conference Paper Accept/Reject Notifications~~

February 6, 2017 Seminar, Forum and Workshop Proposals Due

February 10, 2017 Revised Conference Papers/Final Technical Papers Due

February 20, 2017 Conference and Technical Paper Final Accept/Reject Notifications

Winter Meeting timelines: I do not have information yet

5) Recent discussions on submissions

- a. At Orlando meeting, Scott tossed out an idea on geo-piles (Urban geothermal applications)
- b. Conference Paper: Design criteria for PV/GSHP (paper) (Zheng oneil- U of Alabama) (apparently was submitted, but rejected)

- c. Zio Bing working on speaker for our TC and/or Forum titled "How Low of Price can we go?" (missed deadline for St. Louis)
- d. Re-try Forum or seminar related to EPA 111D (Cary Leading with support of Xio Bing, Chris Gray). Looking to tie in to Track 8: (Renewable Energy Systems and Net Zero Buildings). Idea of getting speaker from "GEO", John Shonder from FEMP, reach out to Mark Ames ASHRAE Mngr of Govt Affairs
- e. Carl Huber gave several ideas for talks. Didn't think we had enough to fill a whole seminar, so I reached out to other TC's to see if they would be willing to co-sponsor, or take on Carls Talks). This progressed, but nothing materialized for St. Louis.
- f. Carl Huber is proposing several seminars: 1) alternative refrigerants (track 1) (seminar or maybe symposium paper) (possible co-sponsorship with TC 8.1 or 8.11) 2) Benefits of "variable capacity" geo heat pumps (Track 4) (possible co-sponsorship with TC 8.1 or 8.11) 3) Benefits of "wifi" connected geothermal heat pumps with remote monitoring and data logging capability (Track 5) (possible co-sponsor with TC 7.5) 4) Design and Benefits of "vapor injected" geothermal heat pumps. (possible co-sponsorship with TC 8.1)

6) PLANNED SUBMISSIONS FOR LONG BEACH: (to be determined from sub-committee meeting on Sunday)

7) Winter Meeting Tracks Chicago

TBD

8) Possible SUBMISSIONS FOR Long Beach?

- a. Commissioning of Geothermal Heat Pump Systems: Kuk willing to chair
- b. Direct Expansion Ground Source Heat Pump: Issues, Advancements and Advantages: Parham Eslami Nejad, Ph.D.

Handbook Chapter Revision Agenda and Meeting Minutes

(to be completed semiannually)

TC Handbook Subcommittee Chapter Revision Process

DATE: 2017-01-29

SESSION: *Geothermal Energy*
Chapter 34 (TC6.8)

PREPARED BY: Harrison Skye (harrison.skye@nist.gov), Handbook Subcommittee Chair

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Ryan Carda (rcarda@geoconnectionsinc.com)
Scott Hackel (shackel@ecw.org)
Xiaobing Liu (liux2@ornl.gov)
Lynn Werman (lynnwerman@yahoo.com), Handbook Liaison

AGENDA and POINTS of DISCUSSION:

- **Schedule – 1-year Outlook**
 - 2017-01-29: TC 6.8 Handbook subcommittee meets at ASHRAE in Las Vegas
 - Establish reviewers for each revised section
 - 2017-02-01: Chapter draft submitted to subcommittee
 - 2017-04-01: Reviews due to revisers, with comments
 - 2017-06-01: Revisers finish updated sections
 - 2017-06-25: Revised chapter submitted to TC
 - 2017-09-25: TC provides comments
 - 2017-12-31: Chapter revised based on TC comments
 - 2018-01-21: TC votes on proposed revised chapter

- **Lead Reviser Chapter Revision Status**

- New/revised sections submitted to ASHRAE Authoring Portal
 - Grout section – Ryan Carda
 - Reorganize chapter to put GSHP material 1st – Harrison Skye
 - Move statement about renewability to end of chapter
 - Antifreeze section moved up one level
 - Minor changes & typos – Harrison Skye
 - Temperature Penalty change – Dennis Koop
 - Discussion
 - Steve K will review Dennis K's submission.
 - Make sure to keep caveat that there is large uncertainty in long-term temperature penalty
 - Change Example 1 to ASHRAE headquarters – Dennis Koop
 - Discussion – Decided to keep this example the same
- Sections completed, but yet to be incorporated with chapter
 - Should be done by section author. Ensure material is placed with existing related content in mind
 - Placeholder for sections are in main chapter document on ASHRAE Authoring Portal
 - Direct exchange – Chuck High
 - Standing Column Well – Carl Orio
 - Geopiles – Matt Mitchel
 - SWHP – Matt Mitchel
 - Pressure consideration in deep borehole – Ryan Carda
 - Flushing/Purging update with IMC 2015 code items – Cary Smith
 - Cascading system material – Cary Smith
 - Hybrid system design – methods to reduce water usage – Scott Hackel
 - Multisource applications (sewer, industrial heat recovery, etc.) – Scott Hackel
- Section status not known
 - Electrolysis and water chemistry for Open Loop systems – Carl Orio

- Carl Orio will put together some material
 - Water Wells – clarification of “careful well design” – Andrew Chiasson
 - Electrolysis with copper lake loops – Bob Koschka
 - Carl Orio will add a comment to discourage use of copper coils
 - Sections not yet completed
 - Borehole Thermal Energy Storage
 - Update old cost data – Steve Kavanaugh requested a snapshot of the chapter to work on
- **Section reviewers**
 - Goal is to have 2 or more reviewers for each section
 - Provide comments/edits directly in document stored in ASHRAE Authoring Portal
 - Section Reviewers
 - See last 2 pages
- **Other reviser updates:**
- **New Business:**
- **Milestones to Reach Before Next meeting (June 2017):**
 - Reviews of each section provided by Handbook Subcommittee
 - Sections updated per reviews
 - Chapter ready to submit to TC
- **Other Comments and Questions:**
 - Alternative methods for sharing the chapter document, if/when the ASHRAE Authoring Portal fails: Google drive, Dropbox

ASHRAE Handbook Geothermal Energy Chapter Reviewers

Section	Author	Reviewer 1	Reviewer 2	Reviewer 3	Reviewer 4
Temperature Penalty	Dennis Koop	Ryan Carda	Steve Kavanaugh	Michelle Bernier	
Change example 1 to ASHRAE Headquarters	Dennis Koop	Brenden Hall			
Standing Column Well additions	Carl Orio	Chuck High	Tim Ross		
Grout section changes	Ryan Carda	Cary Smith			
Hybrid system design - methods to reduce water usage	Scott Hackel	Derek Birdsall	Cary Smith	Dennis Koop	Bob Koschka
Multisource Applications (sewer, indust. heat recovery)	Scott Hackel	Cary Smith	Dennis Koop		
Direct Exchange systems	Chuck High	Howard Newton			
Geopiles	Matt Mitchell	Steve Kavanaugh			
Surface Water Heat Pump additions	Matt Mitchell	Chuck High			
Pressure considerations in deep boreholes	Ryan Carda	Cary Smith			
Flushing/Purging update with IMC 2015 code items	Cary Smith	Duane Harman	Roshan Revanker		
Electrolysis and water chemistry for Open Loop systems	Carl Orio				
Water Wells – clarification of “careful well design”	Andrew Chiasson	Kay Thrasher			
Electrolysis with copper lake loops	Carl Orio	Bob Koschka			
Update cost data	Steve Kavanaugh	Derek Birdsall	Roshan Revanker		

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TC6.8 Standards Subcommittee Report

Lisa Meline, P.E.

January 31, 2017

Subcommittee Members:

Bob Brown

Mike Green

Steve Hamstra

Joe Parsons

Cary Smith

The revisions for **ASHRAE Standard 194 Method of Test for Direct-Expansion Ground-Source Heat Pumps** were submitted to ASHRAE the week of January 9, 2017 for publication and public review. Lee Millies is the SPLS liaison if additional information is required. The review request was for 60 days.

ANSI/CSA C448 Series 16 – Design and installation of ground source heat pump system for commercial and residential buildings was published and made available for sale just under one year ago. All 211 pages are now available for purchase. The next revision cycle is being planned and will likely kick off just prior to the *2017 IGSHPA Conference and Expo* on March 13, 2017 in Denver Colorado. A joint meeting between the IGSHPA Standards Committee and CSA is currently scheduled to discuss this Standard among other things.

The **Uniform Solar Energy and Hydronics Code** is currently working through its next revision cycle. Cary Smith and two others from IGSHPA are serving on the IAPMO Technical Committee reviewing proposed changes. Cary will be working on revising the proposed changes submitted a year ago, as a member of the IAPMO TC. The Subcommittee (listed above) is available to review and respond to the proposed changes when available. We invite others from the full committee to join us.

There has been no movement on **ASTM E4415 – Installation, Testing, Commissioning, and Maintenance of Closed Loop, Ground Source Geothermal Heat Exchanger**.

	B	C	D	E	F	G	H	I	J	K	L	M	
1	TC/TG/TRG Activity Feedback Form												
2													
3	Please provide feedback on your TC/TG/TRG activities and return this form by Tuesday night 9:00 pm to your Section Head by email or drop off a printed copy in the Section Head's mailbox folder outside the ASHRAE Headquarters Room.												
4													
5	Include activities performed since the last TC meeting (e.g. any letter ballots, submissions to RAC, award nominations, etc.)												
6	PLEASE DO NOT LEAVE NUMERIC CELLS EMPTY. ENTER 0 IN CELLS IF THERE IS NO COUNT.												
7	TC#	6.08		Committee Name:			Geothermal Heat Pump and Energy Recovery Applications						
8				Chair:			Chris Gray						
9													
10	Meeting was Held (City)	Las Vegas				(Day)	Tuesday		(Date)	1/31/2017			
11													
12	Membership				Quorum Established (Yes/No)				YES				
13					Number Present		Remote Participants		Total on Committee Roster				
14	Voting Members (excluding Non-Quorum Members)				10		0		17				
15	Non-Quorum Members				0		0		2				
16	Corresponding Members				30		0		111				
17	Provisional Members				0		0		8				
18	Visitors/Guests				2		0		n/a				
19	All members/guests who are ALSO YEA members				6		0		n/a				
20													
21	Handbook Responsibilities						Standards Responsibilities						
22	Total Number of Chapters			2			Total Number of Standards			0			
23	# Chapters voted out this meeting			0			# Standards recommended			0			
24	Special Publications (last six months)			0			Title:						
25													
26	Program Activities (For This Meeting)												
27	Total # of Forums			Total # of Seminars			Total # of Paper Sessions			Other Presentations			
28										TC Research Results	Other Papers**		
29	Submitted*	Sponsor	Co-sponsor	Submitted*	Sponsor	Co-Sponsor	Submitted*	Sponsor	Co-Sponsor				
30	0	0	0	3	3	1	1	1	0	0	0	0	
31													
32	Current Research Activities (active)						TC Management						
33	# of new/revised RTARs submitted			1			Minutes completed on time?			YES			
34	# of other active RTARs			1			Agenda distributed on time?			YES			
35	# of Work Statements submitted			0			Did Chair attend training?			YES			
36	# of other active Work Statements			0			Did Vice Chair attend?			YES			
37	# of active TRPs			0			Did Program Chair attend training?			NO			
38	# of active RPs			1			Did Handbook Chair attend training?			YES			
39	Problems getting RTAR/WS approved?			NO			Did Research Chair attend breakfast?			YES			
40													
41	Other Technical Activities						Award Nominations (last six months)						
42	# FAQs updated this meeting			0			# of Distinguished Service Nominations			0			
43	# New members added to roster			0			# of Exceptional Service Nominations			0			
44							# of Other Nominations: Hightower, Research, Fellow,etc			0			
45							Specify Award :						
46													
47	Any Concerns or requests for the Technical Activities Committee? (Please type in Space Below)												
48													
49													
50													
51													
52													
53													
54													