FINAL MINUTES January 29, 2013

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 2013

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

DATE OF MEETING: January 29, 2013 LOCATION: Dallas, TX

Members Present	Year APPTD	MEMBERS ABSENT	Year APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Lisa Meline (Chair)	11-13	JB Singh	10-14	Michel Bernier (CM)
Jeff Smith (Vice Chair)	11-15	David Pleasants(ALI)	10-14	Signhild Gehlin (CM)
(Donald) Cary Smith (Sec)	12-16	Charles Remund	12-16	Chris Gray (CM) – Webmaster
Robert Koschka	10-14			Carl Huber (CM)
Kay Thrasher	10-14	(3)		Piljae Im (CM)
John Shonder (Research)	09-13			Steve Kavanaugh (Hndbk)
Roxanne Scott (Pub)	11-15			Xiaobing Liu (CM)
Ed Lohrenz (MNQ-V)	11-15			Spencer Morash (CM)
Scott Hackel	11-15			Bill Murphy (CM)
Mike Kuk (Program)	10-14			Howard Newton (CM)
Jeremy Fauber	12-16			Chris Paraskevakos (CM)
Gary Phetteplace	12-16			Tim Roos (CM)
David Dinse (MNQ-V)	12-16			Keith Swilley (CM)
Jeff Spitler	12-16			Shaojie Wang (CM)
(12 Voting and 2 Voting NQ)				Guests
				Rupert Alfilaz
				Trey Austin
				Krishna C. Bashyam (Stu)
				James Cullin (Stu)
				Ray Good
				Steven Hamstra
				Chris Haws
				Matt Mitchell (Stu)
				Joe Parsons
				Roshan Revankar (IGSHPA)
				Manoj Selvakumar
				Brian Seyller
				Sudla Sikla
				Matt Tressler
				Zeyu Xiong (Stu)
				(29)

DISTRIBUTION - ALL MEMBERS OF TC/TG/TRG

TAC Chairman: _____ William McQuade
TAC Section Head: _____ John Dunlap
ALI/PDC: _____ Donald Brandt

LIAISONS

RAC Research: _____ Stephen Hancock
Chapter Technology Transfer Committee: _____ Marian Roll
Special Publications: _____ Francis Mills
Program: _____ Lane Jackins
Standards: _____ Debra Kennoy
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, 29 January 2013 at 3:30 PM in the Dallas Ballroom A3, Sheraton Conference Center, Dallas, TX. The meeting was held in conjunction with the ASHRAE 2013 Winter Meeting.

I. CALL TO ORDER, WELCOME, INTRODUCTIONS

Chair Lisa Meline called the meeting to order at 3:33 PM. The Chair welcomed everyone. Members, guests, and ASHRAE Committee liaisons were requested that they introduce themselves. 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

Fifty percent of the voting members of the technical committee, present in person, constitute a quorum for the transaction of business. The Chairman read the list of voting members to confirm that the roster was correct. The roll call revealed that twelve (12) of fifteen (15) Quorum members of the technical committee were present, [there are seventeen (17) listed voting members of which two (2) are member non quorum-voting] establishing that a quorum was available to conduct committee business.

III. APPROVAL OF MINUTES

The Secretary distributed copies of the minutes of the June 26, 2012 summer meeting in San Antonio, and the Chair requested that members review them. It was moved and seconded to accept the minutes. Minutes approved (13-0-CNV).

IV. ANNOUNCEMENTS FROM ASHRAE

There were no announcements from ASHRAE.

V. ANNOUNCEMENTS FROM THE CHAIR

A. Jeff Smith reported on the Chairs' breakfast.

1. The ASHRAE Code of Ethics was read aloud to the members, visitors and guests of TC6.8. The purpose was to put a procedure in place to address alleged infractions of the Code. (A copy of the Code of Ethics, Section **1.140.001** Code of Ethics, **1.140.002** Conflict of Interest**, and 3.**980 Enforcement Procedures for Violation of the ASHRAE Code of Ethics is attached to these minutes.) See Attachments.
2. Denver Seminar and Forum proposals are due by February 11, 2013
3. Abstracts for any of the 8 tracks for New York need to be in by March 15. 2013.
4. There will not be a Plenary Speaker in Denver.
5. The Society needs reviewers for technical papers.
6. Reminded the Chairs to keep their web pages updated. Remind voting members and CMs to update their profiles.

B. Lisa informed the Committee that there was a collaborative effort being made by IGSHPA, GEO, and NGWA that could include ASHRAE where resources and open dialog would provide a forum to share information and coordinate industry efforts, identify needed research, and identify ANSI Standards that may be needed in the industry. See related and additional information under Section X, New Business.

VI. ACTIVITY DISCUSSION (EXTRAORDINARY)

Jeff Spitler made a presentation regarding his research from 5:30-6:30pm during the Committee Meeting.

VII. SUBCOMMITTEE REPORTS

A. RESEARCH – John Shonder

News from the Research Breakfast

1. Work Statement on Outdoor Air was returned again. No letter yet, but they found a few things that needed to be updated or changed:
   a. Uses old Strategic Goals.
   b. "Don't lock into one commercial tool." John was not sure what this means but perhaps the mention of e-Quest? John will research this a bit deeper and get back to the committee.
   c. "Executive Summary is too long."
2. Our RTAR on Environmental Effects of GSHP was sent back. Seems like we have to de-emphasize the word "environmental" because that's not what ASHRAE does.
3. Interesting to see how few TCs are working the research process. In Dallas they evaluated 3 RTARs and 4 Work Statements. RAC needs more research projects.
4. Agami Reddy made a point of saying that Unsolicited Research Proposals are discouraged. Anyone who has an idea for a research topic, should really work it through the TC. URPs are rarely approved. If you have an idea, write an RTAR or WS, get input from the TC.

Research Topic Ideas

1. Lisa mentioned her round table with other orgs: IGSHPA and GEO and NGWA. Three organizations mentioned ideas that had a common thread: the environmental effects of GSHP systems.
   a. Geo: Development of Standardized Method to Determine Thermal Load Avoided by GSHPs.
   b. ASHRAE: Long term temperature effects on the local soil temperature due to GHXs (data collection; no models).
   c. NGWA: How much heat may be rejected or absorbed by a cubic foot of soil and to what distances from the borehole will this temperature plume extend?

   John is going to work with Lisa to revise our RTAR on environmental effects of GSHP Systems.
2. The Committee voted to prioritize our research agenda as
   a. Design of GSHP central plants
   b. Design of systems using multiple variable speed devices (compressors, pumps, fans, etc.); how they are modeled, designed, controlled, validated. (13-0-0-CNV).
3. Two other topics were suggested:
   a. Design for deep boreholes (500-800 feet).

b. Maintenance Costs of GSHP Systems (Keith).

B. HANDBOOK COMMITTEES

Steve Kavanaugh – The sub-committee met on Sunday Jan. 27 at the 2013 ASHRAE Winter Annual meeting in Dallas. The revision items listed below were distributed to TC members prior to the meeting. Each item was discussed at the sub-committee meeting and results are summarized below with the volunteer reviser's name and some brief comments.

March 31 was originally suggested as the due date for draft revisions. This date has now been suggested as the due date for summaries to be provided by revisers for each section with a new draft due date of May 24, 2013. See attachment for full detail of the 6.8 Handbook Subcommittee Minutes.

Chris Gray - ASHRAE TC 9.4 Handbook (Applied Heat Pumps and Heat Recovery) Sub-committee report
January , 2013. Meeting Date: January 27, 2013, 5PM-5:40PM Applied Heat Pumps and Heat Recovery handbook chapter.
Attendees: Mike Filler, Chris Paraskevakos, Frank Pucciano, Gary Phetteplace, and Ed Lohrenz
The time was spent discussing a figure of potential heat recovery chiller locations within a central plant as provided by Frank. The discussion revolved around the need to include the pros/cons and key design points around placing a heat recovery heat pump in one of four locations (on the chilled water loop before the evaporator, on the cooling tower loop between the condenser and tower, in parallel with the tower, or between the tower and condenser). Further discussion revolved around including more industrial applications including wastewater treatment plants along with performance data.
It was decided to have a three hour working session at the Denver meeting from Noon-3PM on Saturday, June 23, 2013. This time will be used to develop an outline of material to be added to this round of handbook edits. See full minutes in the attachment.

C. MEMBERSHIP COMMITTEE – Gary Phetteplace

2013 Roster is complete. There were three additional Provisional Corresponding Members to the roster subsequent to this meeting. The 6.8 committee currently has seventeen (17) members, fifteen (15) voting and two (2) NQV. Next rotation five (5) members will roll off and four new members will roll on, reducing the committee to sixteen (16).

D. PROGRAMS COMMITTEE – Michael Kuk

1. TC 6.8 hosted Seminar 9 "Foundation Heat Exchangers for Low Cost Residential Ground Source Heat Pumps". The Seminar was chaired by Dr. Bernier. The Presenters were R. Spitler, Dr. Im, and Dr. Fisher. There were over 100 attendees.
2. Michael discussed ASHRAE's Denver and New York program tracks. The following dates are important regarding program and technical paper submittals for the conference:
    a. Feb. 11-Seminar, Forum, Technical Paper and Conference Paper program proposals due.
    b. March 25-Seminar and Forum Accept/Reject are distributed
    c. May 6- Upload of PPTs begin

d. June 3- All PPTs due online
e. June 22 Speaker's Lounge is opened.

3. Denver Tracks are:
   Track 1: Research Summit
   Track 2: Integrated Project Delivery (mini conference)
   Track 3: Building Energy Modeling vs. M&V
   Track 4: Mile-High Efficiency and Equipment
   Track 5: Renewable and Alternative Energy Sources
   Track 6: HVAC&R Systems and Equipment
   Track 7: HVAC&R Fundamentals and Applications
4. Denver Meeting, June 22-26, 2013
   a. Top Dumb Things Engineers and Designers Do To Drive Up Geothermal Heat Pump System Costs Chair- Lisa Meline (Seminar) Track 7
      i. Kavanaugh- EPRI Survey Results
      ii. Dom Durbin -Well Driller's Perspective
      iii. Mark Morelli – Contractor's Perspective
   b. Frank Pucciano and Mike Filler are putting together a two-part program for Track 5.
      i. Part I: Heat Recovery Heat Pump Applications as an Alternative Energy Source- Commercial Applications (Michael Filler)
         1. HRHP applied to chilled water return.
         2. HRHP applied to a cooling tower loop.
      ii. Part II: HRHP …Large Scale Applications (Frank Pucciano)
         1. Recovering energy from a Compressed Air System with a HRHP.
         2. Recovering Energy from a Waste Water Treatment Plant.
5. New York Tracks are:
   Track 1: HVAC&R Systems and Equipment
   Track 2: HVAC&R Fundamentals and Applications
   Track 3: Environmental Health through IAQ
   Track 4: Building Information Systems Integrating Technology for Control, Management Optimization and Efficiency
   Track 5: International Design
   Track 6: Building Performance and Commissioning for Operation and Management
   Track 7: Hydronic System Design for Large Buildings
   Track 8: Tall Buildings: Performance Meets Policy
6. New York Meeting January 18-22, 2014
   a. Fundamentals of System COP/EER – Chair- Cary Smith;
      i. Kavanaugh, Steve. Converting Imaginary (Rated) Efficiency to Real Efficiency
      ii. Hackel, Scott. More Than Just a Borefield – Impacts of Different System Choices for Geothermal Projects

iii. Swilley, Keith. Keep it Simple and GSHP Will Win the Efficiency Debate.

b. Michael Kuk with assistance of Scott Hackel will put together a topic for Track 6 related to Commissioning of GHP systems. Will likely reach out to TC 7.9 (commissioning) to co-sponsor a seminar.

7. Lisa and Dr. Spitler initiated a discussion about submitting a GHP Systems track for the Seattle meeting.
   a. The group discussed the need for our committee to start lining up topics and speakers for this track. We don't "own" the track, but we want to make sure that the track is successful so we want to promote the track to other TC's, line up topics, and spread the word to outside organizations. It was proposed that we could put out a call for papers to other GHP related organizations so that they can present at the ASHRAE meeting (e.g. IGSHPA, NGWA, GEO, etc.).
   b. Lisa Meline has generated a list of potential topics for this track:
      i. Historical review of GHP industry
      ii. Industry update (legislation, standards and training)
      iii. Heat pump innovations
      iv. Piping and pumping strategies
      v. Pipe Materials, Grout and Ground Heat Exchangers
      vi. Drilling Technologies
      vii. Hybrids and complimentary technologies
      viii. Feedback from the field (drillers, building owners and contractors)
      ix. Accessing a project site for geothermal heat pumps
      x. Back to the basics
      xi. Manufacturers panel
      xii. Top dumb things engineers and designers do to drive up costs
      xiii. Debate continues : SEER vs. EER
      xiv. Hybrid GHP and Renewables
      xv. Research / conference papers
      xvi. Forum (hot topics)

The Program addenda items were not contested.

E. WEBMASTER – Chris Gray

The webpage is up to date. Chris has discussed having other publications on the website. We can place articles that are relevant and have been published by ASHRAE on the site, but not papers.

F. STANDARDS – Chuck High

SPC 194 (method of test for direct expansion geothermal ground source systems) publishing their final results on the Method of Test for Direct Expansion Ground Source Heat Pump.

G. EDUCATION, SPECIAL PUBLICATIONS, and JOURNAL – Roxanne Scott

1. The Publications Committee (PC) is working on mobile apps and e-books -if development decisions are based on sound financial and market data, the Publications Committee would support them.
2. ASHRAE's wiki up and running. The PC is now looking at making it into an App.
3. The PC passed a motion to establish the International Subcommittee as a standing subcommittee for developing international ASHRAE activities and communication.
4. At this time, there are no publications on the outdated list for TC6.8.
5. Bill Murray reported that the Blue Book update started in January.

VIII. LIAISON REPORTS

A. ALI COORDINATOR – David Pleasants

No Report.

B. T.C. 8.11, Unitary Systems – Roxanne Scott

Work Statement #1642 "Improved Compressor Performance Modeling Methodology for use in System Simulation Programs" was presented.

C. IGSHPA – Lisa Meline, Cary Smith, Howard Newton

1. Lisa Meline has been selected as Chair of the Standards Committee. Revised IGSHPA Standards are being updated and should be published soon.
2. Roshan Revankar is the new Director of Training and has been on the job for seven months.

D. EPRI - No report.

IX. OLD BUSINESS

Xiaobing reported that the National Certification Standard is out for public review and comment. This standard identifies disciplines, scope of work, and qualifications for various GX industry jobs. Comments are due by the end of February.

Geothermal **Heat Pump National Certification Standard** Project www.ghpncs.org

X. NEW BUSINESS

A. The Chair seeks approval to form a TC6.8 Standards Subcommittee to work with the Canadian Standards Association (CSA), ASHRAE, IGSHPA and NGWA to create an ANSI Standard for Closed Loop/Geothermal Heat Pump System Design in Northern America. The Standard will be collaborative and may include content currently existing in the following documents:

- C448 design and Installation of Earth Energy Systems
- IGSHPA's Closed Loop/Geothermal Heat Pump Systems Design and Installation Standards.
- ASHRAE's HVAC Application Handbook Chapter on Geothermal Energy and Systems and Equipment Handbook Chapter on Applied Heat Pumps and Heat Recovery Systems.

The collaborative effort is intended to leverage shared industry resources including drillers, designers, installers, manufacturers, and researchers.

The Chair moved to accept the proposal. The motion was seconded by Jeff Smith. The proposal was approved 14-0-0.

B. Should TC 6.8 attempt an electronic meeting at the Denver meeting? ASHRAE will permit "electronic attendance" however an individual must be identified that will set up and oversee the electronic meeting process. Discussion followed regarding the ability of the committee to undertake setting up and conducting the electronic meeting and their ability to provide assurance that the process will work from meeting to meeting. The general consensus was that we could not assure the Committee membership that the electronic meeting would work.

C. Dr. Spitler requested a "no-cost extension to allow for the final write-up of his research project.

D. The chair noted that sub-committee members may change their meeting date, time, and place but that the meeting and any changes should be posted on the web site.

XI. ADJOURN

Gary Phetteplace moved that the meeting be adjourned in order to start Dr. Spitler's presentation.. Second by Jeff Smith. The motion carried. The meeting ended at 5:14 PM.

Six pages of attachments follow:

1. ASHRAE Code of Ethics.
2. Handbook subcommittee minutes.
3. Proposed GSHP Track descriptions.
4. Proposal to work with the Canadian Standards Association (CSA).

ASHRAE Code of Ethics:

1.140 CODE OF ETHICS – Notes 1/23/10

1.140.001 Code of Ethics 100-107-001 74-06-23-28/86-06-22-23/07-01-31-16
As members of ASHRAE, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct. Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare. Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources. Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need. We shall act with care and competence in all activities, using and developing up to date knowledge and skills. We shall avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist. The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected. Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work. Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.

1.140.002 Conflict of Interest – ASHRAE Members 100-105-001 93-01-27-22/01-02-01-94/08-06-25-15A
1. All members of the Society are encouraged to participate in any ASHRAE sponsored or funded project where their expertise can be effectively used.
2. Care should be taken to avoid actual or perceived conflict of interest.
3. Unsuccessful bidders on a project should not be used on the monitoring committee for the project unless it is necessary in order to bring the best expertise of the Society to bear on the project.

3.980 Enforcement Procedures for Violation of the ASHRAE Code of Ethics
(07-01-31-17) Every member and body of the Society is responsible for upholding, supporting and enforcing the Code of Ethics. It is the preference of the Society to resolve ethical issues on an informal basis. Where the informal process does not produce a satisfactory result, any member or body may initiate a formal written complaint requesting that the Board of Directors (BOD) investigate a breach of ethics by a member or body. The complaint should be forwarded in a confidential letter to the Board of Directors in care of the executive vice-president and chief staff officer (EVP). The complaint shall clearly identify the complainant and be in the form of a notarized affidavit, signed by a member of ASHRAE in good standing. If the complaint involves a member of the BOD, that person shall be recused from all deliberations and actions concerning the complaint.

The complaint should include:

a. The name and address of the member or body whose conduct is the subject of the complaint.
b. A statement which sets forth with specificity the alleged conduct of the member or body whose conduct is the subject of the complaint.
c. The specific provisions of the Code of Ethics which the conduct is alleged to have violated.
d. The names and addresses of persons believed to have knowledge pertaining to the subject of the complaint.
e. The identification and location of documentation or materials upon which the complaint is based.
f. A statement from the member submitting the complaint declaring that they will be present at any hearing at which the complaint is being considered if requested by the deliberating body.

3.980 Enforcement Procedures for Violation of the ASHRAE Code of Ethics (cont.)

No complaint shall be considered if based on conduct more than two years prior to the complaint or more than two years after the complainant would have reasonably been made aware of the activity forming the subject of the complaint. The EVP shall acknowledge receipt of the complaint within a reasonable period. Copies of the complaint shall be distributed only to members of the ASHRAE Executive Committee (ExCom) and to ASHRAE legal counsel. ExCom shall review the complaint and conduct a preliminary investigation. During this investigation, the names of the complainant and the subject of the complaint will be undisclosed to the extent possible. ExCom will decide to terminate the complaint or present the complaint to the BOD for consideration. If terminated, the complainant and the subject of the complaint will be notified in writing by the EVP, with a complete explanation of ExCom's action. ExCom may terminate the complaint investigation process at any time if there is any disclosure of the complaint or its contents by the complainant prior to the complaint being referred to the BOD, if the complainant fails to respond to a written request for further information within sixty days, or if the complainant has initiated legal proceedings based on the same or related circumstances underlying the complaint.

If the complaint is not terminated by ExCom, the presiding officer of the BOD may appoint a three person tribunal to conduct a thorough investigation of the complaint. At the conclusion of the investigation, the tribunal will schedule a confidential hearing to allow the member or body charged to respond to the charges. The respondent will be given thirty days notice of the hearing before the tribunal or the BOD. The hearing may be in writing, electronic or face-to-face, at the option of the member or body charged. The hearing will be organized to minimize the cost and inconvenience to the complainant, respondent and members of the tribunal. The tribunal shall prepare a complete report to the BOD including a recommendation of BOD action. If the tribunal recommends that the BOD adjudicate the complaint, all deliberations shall be in executive session. The BOD may censure, warn, suspend or expel a member or members if they are found to have violated the Code of Ethics. Any action against members will be governed by the provisions for discipline in the Society Bylaws.

ASHRAE TC 6.8 Handbook (Geothermal Energy Chapter) Sub-committee report
Feb. 5, 2013
Steve Kavanaugh, TC 6.8 (geo-chapter) Sub-Committee chair

The sub-committee met on Sunday Jan. 27 at the 2013 ASHRAE Winter Annual meeting in Dallas. The revision items listed below were distributed to TC members prior to the meeting. Each item was discussed at the sub-committee meeting and results are summarized below with the volunteer reviser's name and some brief comments.
March 31 was originally suggested as the due date for draft revisions. This date has now been suggested as the due date for summaries to be provided by revisers for each section with a new draft due date of May 24, 2013.

Direct Use Section

1. Consider rearrangement of the chapter to at least lump the 'Resources' section in with 'Direct Use'; could also move 'Direct Use' to the end of the chapter. Sub-committee agreed to leave as is.

Ground Coupled Heat Pump Section

1. Change the design intro to be slightly more applied, add introduction, consider eliminating equation 1. Scott to provide more detail/clarification.
2. Replace bore resistance table (6) with table of empirical data, Remund correlations, Hellström correlations (including four-pipe boreholes)
   Steve to follow format similar to "Determining Thermal Resistance" article in August, 2010 ASHRAE Journal.
3. Add materials of construction/specification info (table?) for HDPE pipe and results of any published work detailing issues with PVC pipe and HFC lubricants, discuss pipe expansion issues (length & tank sizing), Lisa.
4. Add discussion of water quality, environmental impact of inhibitors/antifreeze solution, impact on pipe material selection, Lisa.
5. Update grout info and review soil & rock thermal property (table 5) Steve or Cary?
6. Review/edit bore completion table (4), possibly reference NGWA or IGSHPA documents, Cary.
7. Full revision of hybrid section. In a similar vein, add more discussion about utilitizing hourly annual load calcs (i.e. energy simulation) for design. Scott needs improved piping diagrams. Recommendations based on field verified results with cost savings if available.
8. Add results of EPRI survey, Steve add if space permits – short paragraph with reference to Journal articles if space unavailable.
9. Add one-pipe loop diagram, Steve or Kirk.
10. Modify and condense pipe circuiting diagrams, guidelines, recommendations Steve
11. Add section on purging closed loop systems, Cary and Steve.
12. Provide outline for standard indicators of system performance reporting: energy use, installation cost, maintenance requirements, etc.,Steve.
13. Provide recommendations for installing/locating equipment for service, acoustics, etc. Might be better placed in Applied HP/HR chapter, discuss with Chris.
14. Reference TVA thermal property map as an example of useful information sharing (http://www.tva.com/commercial/TCStudy/index.htm) Steve and others who may know of other data bases.
15. Revise/add additional information on central plant systems and how they compare to distributed systems (include recent info presented in conference seminars), Scott.

16. Condense the section on central vs. sub central vs. unitary if possible to make space for other additions, while revising to account for new discussion on piping (steel/HDPE/etc.). Covered in items 3, 9 and 10.
17. Improve example designs/calcs (connect with item 1 above).
18. Add brief discussion of the impact of laminar flow in the borehole (effect at full load, effect at part load) …. Along the same vein, discuss the impact of pipe conductivity (we are starting to see HDPE pipes with higher thermal conductivities). Can be included (with more direct elaboration) and addressed with improved computation related to table 6, see item 2 above.
19. Because of its historical importance and its ease of use we should present the concept of the g-function, Michel.
20. Introduce and provide general guidance on Seasonal Borehole Thermal Energy Storage systems. Michel, TC 6-9 responsibility?, coordinate with sub-committee chair for Chp. 51, 2012 Systems Handbook.

Groundwater Heat Pumps Section

1. Add residential section, No volunteer.

Surface Water Heat Pumps Section

1. Update SWHP section pending OSU research results, Jeff.
2. Add residential section, No volunteer.
3. Include empirical lake temperature data plots and links, No volunteer.

ASHRAE TC 9.4 Handbook Applied Heat Pumps and Heat Recovery (AHPHR) Sub-committee report
January , 2013
Chris Gray, TC 6.8 AHPHR Sub-Committee chair

Attendees: Mike Filler, Chris Paraskevakos, Frank Pucciano, Gary Phetteplace, Ed Lohrenz

Meeting Date: January 27, 2013, 5PM-5:40PM Below is a brief recount of the subcommittee meeting of the Applied Heat Pumps and Heat Recovery handbook chapter for minutes:

The time was spent discussing a figure of potential heat recovery chiller locations within a central plant as provided by Frank. The discussion revolved around the need to include the pros/cons and key design points around placing a heat recovery heat pump in one of four locations (on the chilled water loop before the evaporator, on the cooling tower loop between the condenser and tower, in parallel with the tower, or between the tower and condenser). Furthermore, the point was made that examples need to be cited for each of these placement types and the implications of each location need to be fully described.

Further discussion revolved around including more industrial applications, including wastewater treatment plants, along with performance data.

It was decided to have a three hour working session at the Denver meeting from Noon-3PM on Saturday, June 23, 2013. This time will be used to develop an outline of material to be added to this round of handbook edits.

Proposed:

Ground Source Heat Pumps State of the Art: Design, Performance and Research

Track Chairs: Jeff Spitler, PhD; Michael Kuk, P.E.

Email: spitler@okstate.edu; Michael.p.kuk@gmail.com

Ground-source heat pump (GSHP) systems are known to be one of the most energy-efficient, cost effective, and environmentally benign HVAC options available. This has been proven over and over again through energy efficient buildings which are the highest performers in EnergyStar and LEED performance ratings. However this performance only comes with proper design and application of the technology. This track will take the engineer through all aspects of design that lead to optimally performing systems and satisfied building owners. It will also help the engineer avoid common pitfalls that lead to poorly performing systems. Research into innovative systems, heat exchanger performance, design and simulation methods, and optimal operation will also be covered. Papers/presentations are invited for all types of GSHP systems– including closed loop, open loop, vertical, horizontal, standing column wells, energy piles, and surface water heat pump systems.

The following was sent to all of the voting members of TC 6.8 prior to the Tuesday Committee meeting in Dallas (January 29, 2013)

Proposal for TC6.8 Full Committee Meeting Tuesday, January 29th at 3:30pm

The Chair seeks approval to form a TC6.8 Standards Subcommittee to work with the Canadian Standards Association (CSA), ASHRAE, IGSHPA and NGWA to create an ANSI Standard for Closed Loop/Geothermal Heat Pump System Design in Northern America. A vote will be taken.

The standard will be collaborative and *may* include content currently existing in the following documents:

- C448 Design and Installation of Earth Energy Systems
- IGSHPA's Closed-Loop/Geothermal Heat Pump Systems Design and Installation Standards
- ASHRAE's HVAC Application Handbook Chapter on Geothermal Energy and Systems and Equipment Handbook Chapter on Applied Heat Pumps and Heat Recovery Systems.

The collaborative effort is intended to leverage shared industry resources including drillers, designers, installers, manufacturers, and researchers.

The first task delegated to the TC6.8 Standards Subcommittee is to write a Title/Purpose/Scope document for review and approval of this proposed Standard by ASHRAE.

https://www.ashrae.org/standards-research--technology/standards--guidelines/titles-purposes-and-scopes.

Next, the Standards Subcommittee shall secure approval of the Title/Purpose/Scope documents by ASHRAE (PPIS, StdC, and the Board) and CSA.

Finally, assuming approval is given, the following general steps are anticipated for developing the CSA/ANSI/ASHRAE/NGWA/IGSHPA Standard

- Form an executive committee; establish a draft scope
- Build membership with Canadian and US members (canvas IGSHPA, ASHRAE, NGWA in the US) ensure gaps are filled (drilling experts)
- Establish meeting schedule (noting locations for meetings)
- Establish timeline for publication including major milestones (including steps required for accreditation)
- **Meetings (review of landscape; noting gaps; required changes)**

Lisa Meline, P.E.