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. TC 4.2 ___________________ DATE: February 2, 2013

TC/TG/TRG TITLE: Climatic Information

DATE OF MEETING: June 28, 2011 LOCATION: Montreal, QC, Canada

<table>
<thead>
<tr>
<th>MEMBERS PRESENT</th>
<th>MEMBERS ABSENT</th>
<th>EX/OFFICIO MEMBERS AND ADD'L ATTENDEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steve Cornick (Chair)</td>
<td>J Patrick Carpenter (VM)</td>
<td>Phillip Jarrett</td>
</tr>
<tr>
<td>Didier Thevenard (VC, Web, ALI, VM)</td>
<td>Evyatar Erell (NQ)</td>
<td>Jim Pegues</td>
</tr>
<tr>
<td>Dru Crawley (Sec, Res, Stds, CM)</td>
<td>Geoffiry Levermore (NQ)</td>
<td>T. Agami Reddy (RL)</td>
</tr>
<tr>
<td>Juan Carlos Baltazar (VM)</td>
<td>Stuart Malkin (VM)</td>
<td>Dave Westberg</td>
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<tr>
<td>Chip Barnaby (VM)</td>
<td>Ronald Petersen (VM)</td>
<td>Chuck Khuen</td>
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<tr>
<td>Neal Lott (VM)</td>
<td>Anthony Arguez (CM)</td>
<td>Sophie Pelland</td>
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<tr>
<td>Bob Morris (VM)</td>
<td>Bill Bahnfleth (CM)</td>
<td>Paul Stackhouse</td>
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<tr>
<td>Norm Bourassa (CM)</td>
<td>Constantinos A Balaras (CM)</td>
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<tr>
<td>Don Colliver (CM)</td>
<td>Bryan Becker (CM)</td>
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<tr>
<td>Larry Degelman (CM)</td>
<td>Jui-Chen R. Chang (CM)</td>
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<tr>
<td>Chris Guymbard (CM)</td>
<td>Reda Djebbar (CM)</td>
<td></td>
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<tr>
<td>Joe Huang (CM, Hon)</td>
<td>Brian Fricke (CM)</td>
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<tr>
<td>Clayton Lampman (CM)</td>
<td>Kenneth Hubbard (CM)</td>
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<td></td>
<td>Achilles Karagiozis (CM)</td>
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<td></td>
<td>Linda Lawrie (CM)</td>
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<td>Robert Lucas (CM)</td>
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<td>Richard Perez (CM)</td>
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<td>Michael Roth (CM)</td>
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<td></td>
<td>Hilda Snelling (CM)</td>
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<tr>
<td></td>
<td>Tom Stoffel (CM)</td>
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<tr>
<td></td>
<td>Charlie Whitlock (CM)</td>
<td></td>
</tr>
</tbody>
</table>

TAC CHAIR: Charles Wilkin
TAC SECTION HEAD: Walter Grondzik
RAC RESEARCH LIAISON: T Agami Reddy
SPECIAL PUBS LIAISON: John Clark
HANDBOOK LIAISON: James Dale Aswegan
CHAP TECH TRANS LIAISON: Andrew Cochrane
PROGRAM LIAISON: Bill Dietrich
PROF DEV COMM (ALI): Filza Walters
STANDARDS LIAISON: James Tauby
STAFF LIAISON (RESEARCH/TECH): Mike Vaughn

Abbreviations: VM = Voting Member, CM = Corresponding Member, NQ= Member Non-quorum
ASHRAE TC/TG/TRG ACTIVITIES SHEET

DATE:  Current as of 1st July 2011

TC/TG/TRG NO.: TC 4.2  TC/TG/TRG TITLE: Climatic Information

CHAIR: Steve Cornick  VICE CHAIR: Didier Thevenard  SECRETARY: Dru Crawley

TC/TG/TRG MEETING SCHEDULE

<table>
<thead>
<tr>
<th>Location-Past 12 Months</th>
<th>Date</th>
<th>Location-Planned Next 12 Months</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montreal, QC, Canada</td>
<td>2011-06-28</td>
<td>Chicago, IL</td>
<td>2012-01-24</td>
</tr>
<tr>
<td>Las Vegas, NV</td>
<td>2011-02-01</td>
<td>San Antonio, TX</td>
<td>2012-06-26</td>
</tr>
<tr>
<td>Albuquerque, NM</td>
<td>2010-06-29</td>
<td>Dallas, TX</td>
<td>2013-01-29</td>
</tr>
</tbody>
</table>

TC/TG/TRG SUBCOMMITTEES

<table>
<thead>
<tr>
<th>Function</th>
<th>Chairman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handbook</td>
<td>Bob Morris</td>
</tr>
<tr>
<td>Research &amp; Standards</td>
<td>Drury Crawley</td>
</tr>
<tr>
<td>Program</td>
<td>Joe Huang</td>
</tr>
<tr>
<td>Honours</td>
<td>Joe Huang</td>
</tr>
</tbody>
</table>

RESEARCH PROJECTS-CURRENT

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Contractor</th>
<th>Monitoring Comm.</th>
<th>Report Made At Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1477-RP</td>
<td>White Box Technologies, Joe Huang, Principal Investigator</td>
<td>Dru Crawley (Chair), Chip Barnaby, Patrick Carpenter, Don Colliver, Steve Cornick, Didier Thevenard, Tim McDowell (TC 4.7)</td>
<td>Yes. Contractor presented work to date to the PMS, draft Final report, and draft User Manual.</td>
</tr>
<tr>
<td>1413-TRP</td>
<td>To be selected</td>
<td>Didier Thevenard (Chair), Chip Barnaby, Steve Cornick, Neal Lott</td>
<td>PES met and made a recommendation at the TC meeting for a contractor selection.</td>
</tr>
<tr>
<td>1613-RP</td>
<td>Numerical Logics</td>
<td>Robert Morris (Chair), Neal Lott, Steve Cornick, Steve Bruning, Dru Crawley</td>
<td>PMS met with the contractor on Sunday, project had just started earlier in the month.</td>
</tr>
</tbody>
</table>
LONG RANGE RESEARCH PLAN

<table>
<thead>
<tr>
<th>Rank Title</th>
<th>RTAR</th>
<th>Work Statement</th>
<th>RAC Approval for bidding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written</td>
<td>TC Approvd</td>
<td>Subm’ed to RAC</td>
<td>Written</td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>1. 1413-TRP-R, Developing Standard Procedures for Filling Weather Data Gaps During Analysis of Measured Building Energy Use</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2. 1561-WS, Procedures to Adjust Observed Climatic Data for Regional or Microclimatic Variations</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3. 1610-WS, Development of a Transposition Model for Clear-Sky Solar Irradiance</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

HANDBOOK RESPONSIBILITIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume</th>
<th>Chapter Title</th>
<th>No.</th>
<th>Deadline</th>
<th>Handbook Sub. Liaison</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 HOF</td>
<td></td>
<td>Climatic Design Information</td>
<td>14</td>
<td>2013-02</td>
<td>James Dale Aswegan</td>
</tr>
</tbody>
</table>

STANDARDS ACTIVITIES – List and Describe Subjects

TC 4.2 is the cognizant TC for Std. 169 Weather Data for ASHRAE Building Standards. The TC 4.2 HOF data has been incorporated into this proposed standard. Other coordination will be undertaken as needed such as with SSPC 169.

TECHNICAL PAPERS from Sponsored Research-Title, when presented (past 3 yrs. present & planned)

- Poster Session, Methods for estimating heating and cooling degree-days to any base temperature (1453-RP) (LV-11-021)
- Updating the ASHRAE Climatic Data for Design and Standards (1453-RP) (AB-10-012)
- Impact of Typical Weather Selection Approaches on Energy Analysis of Buildings (RP-1477) (OR-10-042)
- Influence of Long-term Trends and Period of Record Selection on the Calculation of Climatic Design Conditions and Degree-Days (OR-10-045)
- Evaluation of Typical Weather Year Selection Approaches for Energy Analysis of Buildings (1477-RP) (Louisville, June 2009) (LO-09-072)
- Impact of Solar Models on Building Energy Analysis for Tropical Sites (1309-RP), (Dallas, January 2007) (DA-07-058)
- Comparative Analysis of Four Solar Models for Tropical Sites (RP-1309), (Dallas, January 2007) (DA-07-058)
None currently planned.

- Seminar 16: Climate Change: It’s Happening, So Who’s Responding? TC 2.5 and TC 4.2 Co-sponsor – Las Vegas, January 2011
- Seminar 11: Background on Load Calculations Methodologies (Past and Present); Current ASHRAE Information (Handbook and Publications), TC 4.1 (TC 4.2 co-sponsor) – Orlando, January 2010
- Seminar 45, Climate Change Update (TC-2.5, Global Climate Change, cosponsor)
- Seminar 4, Meso-scale weather modeling for building applications – Chicago 2009

Climatic design information in the 2013 Handbook – Montreal, June 2011


Attachments:
- Schedule and Agenda
- Minutes
- Action Items
- Report from the Chair
- TC/TG Activity Feedback Form
- Research Subcommittee Agenda
- Long-term research plan
- Augmenting surface data with satellite data
## 2011 Annual Meeting Schedule and Agenda, Montreal QC
### TC 4.2 (Climatic Information) and Related Activities

<table>
<thead>
<tr>
<th>Time/Date</th>
<th>Meeting/Event</th>
<th>Hotel, Room, Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saturday, 25 June 2011</strong></td>
<td>No activities planned for TC-4.2</td>
<td></td>
</tr>
<tr>
<td><strong>Sunday, 26 June 2011</strong></td>
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</tr>
<tr>
<td>8:00 to 10:00 am</td>
<td>1477-RP PMS, “Development of Typical-year Weather Files from the ISH Data Base of Historical Weather Data for 2,500 International Locations”</td>
<td>(Hilton) St Lambert (Lower)</td>
</tr>
<tr>
<td>10:00 to 10:30 am</td>
<td>TC 4.2 Program subcommittee</td>
<td>(H) St Lambert (L)</td>
</tr>
<tr>
<td>10:30 to 11:00 am</td>
<td>1613-RP PMS “Update Climatic Design Data in Chapter 14 of the 2013 Handbook of Fundamentals”</td>
<td>(H) St Lambert (L)</td>
</tr>
<tr>
<td>11:00 am to 12:00 pm</td>
<td>TC 4.2 Handbook Subcommittee Meeting</td>
<td>(H) St Lambert (L)</td>
</tr>
<tr>
<td>1:30 to 3:00 pm</td>
<td>Seminar 18: New High Quality Solar Data Sources and Analysis Methods for High Resolution Weather Applications: Part 1 Chair Norm Bourassa</td>
<td>(H) Westmount (L)</td>
</tr>
<tr>
<td><strong>Monday, 27 June 2011</strong></td>
<td></td>
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</tr>
<tr>
<td>10:00 to 12:00 pm</td>
<td>Weather Data SSPC 169, Weather Data for Building Design Standards</td>
<td>(H) Jacques Cartier (L)</td>
</tr>
<tr>
<td>4:15 to 6:00 pm</td>
<td>TC 4.2 Research Subcommittee Meeting</td>
<td>(H) St Lambert (L)</td>
</tr>
<tr>
<td><strong>Tuesday, 28 June 2011</strong></td>
<td></td>
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</tr>
<tr>
<td>11:00 am to 12:30 pm</td>
<td>Seminar 48: New High Quality Solar Data Sources and Analysis Methods for High Resolution Weather Applications: Part 2 Chair Norm Bourassa</td>
<td>(H) Cote St Luc (L)</td>
</tr>
<tr>
<td>1:00 to 3:30 pm</td>
<td>TC 4.2, Climatic Information, Full Committee (H) St Lambert (L) Meeting</td>
<td></td>
</tr>
<tr>
<td><strong>Wednesday, 29 June 2011</strong></td>
<td>No activities planned for TC-4.2</td>
<td></td>
</tr>
</tbody>
</table>
AGENDA, ASHRAE TC 4.2 Climatic Information
1:00 – 3:30 PM, Tuesday, 28 June 2011
Hilton Bonaventure Hotel, St. Lambert Room (Lower Level), Montreal Quebec

Scope: TC 4.2 is concerned with identification, analysis and tabulation of climatic data for use in analysis and design of heating, refrigeration, ventilation and air-conditioning systems. Promotion of effective use of weather information in these applications is also included.

1:00 PM  Call to order
Cornick
Roll call
Crawley
Introductions

Approval of agenda
Cornick
Approval of minutes of Albuquerque and Las Vegas meetings, (29th June 2010 and February 1st, 2011).

Report from the Chair/Announcements
Cornick
Introduction of liaisons (liaison announcements/requests)
Crawley

1:15 PM Membership Roster Rollovers (for July 2011)
Cornick

1:20 PM Review of Action Items and Status
Thevenard

1:35 PM Research
Cornick
Reports on status of current, future and completed research projects:

- 1477-RP (Development of Typical-year Weather Files from the ISH Data Base of Historical Weather Data for 2,500 International Locations)
- 1413-TRP (Filling of data gaps in climatic records)
- 1561-WS (Mesoscale modeling of climatic data)
- 1610-WS Clear sky transposition model
- Long-term research plan
- Other potential research projects: 1325-RP Re-run of hygrothermal weather years

2:05 PM Handbook
Morris

- 1613-RP Update of Climatic Data for 2013 Handbook of Fundamentals
- Revisions and errata

2:20 PM TC-4.2 developments
Cornick

- NASA satellite data
Cornick
- XML schema for climatic design conditions
Barnaby/Thevenard

2:40 PM Program
Huang

- Montreal, Jun 25-29, 2011
- Chicago, Jan 21-25, 2012
- Dallas, Jan 26-30, 2013

2:55 PM Standards Report
Crawley
SSPC 169 Weather Data for Building Design Standards

3:10 PM Old business
Cornick/Thevenard
TC Web Site/Google sites
FAQ #6 weather years for energy calculations

3:20 PM New business
from floor

3:30 PM Adjournment

3:30 PM Executive Session

Next Meeting: Chicago Illinois, Tuesday 24th June 2012
Scope: TC 4.2 is concerned with identification, analysis and tabulation of climatic data for use in analysis and design of heating, refrigeration, ventilation and air-conditioning systems. Promotion of effective use of weather information in these applications is also included.

1:10 pm  Call to order:  Cornick
Chair Steve Cornick opened the meeting. Roll call and introductions. A voting quorum (7 of 9 voting members) was present (see attached TC/TG Activity Feedback Form).

Approval of agenda: Cornick added a new item to the agenda at the end to consider proposals received on 1413-RP. Agenda approved. (Agenda attached).

Approval of minutes of Albuquerque (29 June 2010) and Las Vegas (1st Feb 2011) meetings. Barnaby moved and Baltazar seconded to approve the minutes of the two meetings. (6-0-0, CNV)

Announcements: Cornick made some announcements provided at the Section 4 Chair’s breakfast (see attachment Report from the Chair).

Liaison: Introduction of liaisons (liaison announcements/requests) T. Agami Reddy, section 4 Research Liaison reported that there are opportunities for new work statements to go out for bid. Mike Bilderbeck introduced himself as the new head of Section 4.

1:15 PM  Membership: effective July 1, 2011:  Cornick
Roster Rollovers
Rolls off as voting members – Chip Barnaby, Stuart Malkin, Bob Morris
Rolls on as voting members – Norm Bourassa, Dru Crawley, Joe Huang, Phillip Jarrett, John Kennedy

Executive:
The following members have agreed to take to the following positions after the Montreal meeting:
Didier Thevenard – Chair
Dru Crawley – Vice Chair
Juan-Carlos Baltazar – Secretary
The Chair thanked them for volunteering their services to the committee.

1:35 pm  Review of action items and status  Thevenard
See action items attached.

1:40 pm  Research  Crawley

Research Projects

1477-RP Development of 2,500 TMY weather files for international locations – PMS met on Sunday. Contractor delivered a complete draft of the data files for 3,012 locations including a draft report and, users guide. No need to extend contract. PMS to review by July
22 – comments compiled and sent to contractor first week of August. Depending on the volume and complexity of the comments and how quickly the contractor can respond to the comments with a final report, may recommend to the TC approval of the final report in late August/early September.

1413-TRP Developing Standard Procedures for Filling Climatic Data Gaps for use in Building Performance Monitoring and Analysis – Received 4 proposals on the rebid. PES will recommend accepting one of the proposals in executive session as the end of the meeting.

1561-WS Procedures to Adjust Observed Climatic Data for Regional or Microclimatic Variations – A revised work statement was circulated in advance of the meeting. After much discussion, Morris, Barnaby, and Khuen agreed to refine the deliverables to deal with the TC’s concerns by August 15. Then to be circulated to the TC for a vote.

1610-WS Development of a Transposition Model for Clear-Sky Solar Irradiance – 1610-WS was returned from RAC with comments. Thevenard will submit a revised version by mid-August for review.

1613-WS Update Climatic Design Data in Chapter 14 of the 2013 Handbook of Fundamentals – PMS met on Sunday, Numerical Logics is the contractor. Project started June 1st. PMS and the contractor discussed the data elements and made decisions on several of the ones that were uncertain from the work statement. Project is on time.

Long-term research plan. Cornick distributed a discussion paper which includes discussion of potential new research and outputs from the TC over the next few years (attached). This includes three major objectives: 1) Increase the coverage (number of stations) to more than 10,000 in the Handbook – Fundamentals and Standard 169 by 2021. 2) Develop methodology and ability to generate future design data with associated likelihoods. 3) Develop effective delivery mechanisms.

The committee then had a lively discussion. Key ideas included methods for creating other data from the raw data and guidance on how to find the best climatic data for their particular needs. TC members agreed to review and provide comments back to Cornick (and other TC members) by September 1. Focus should be on identifying potential projects and opportunities for collaboration with organizations working to create data which are useful to the ASHRAE membership.

CEC weather data update. Bourassa reported that the project is complete and Huang has delivered 88 CTZs delivered to the California Energy Commission. 16 files will be available to the public for the next update to the Title 24 Standards.

Publications. Mark Owen had contacted the TC to see if the following products needed to be updated or discontinued:
- Design Weather Sequence Viewer CD
- Extreme Weather Sequence Generator CD
- WYEC2 Data & Toolkit CD

Cornick will ask how many copies of each are being sold and report back to the committee. Morris moved and Thevenard seconded that TC 4.2 has no objection for Publications to withdraw the WYEC2 CD from the bookstore. (4-0-0, CNV)
The handbook subcommittee met on Sunday June 27th (first meeting). Draft of the chapter text is expected in early 2012. Morris and Thevenard agreed to look at other Handbook chapters and proactively work with them. For example, TC 6.7 should remove the solar data from their chapter and reference Chapter 14. The final text for Chapter 14 has to be approved by March 2013.

1613-RP Update of Climatic Data for 2013 Handbook of Fundamentals – PMS met on Sunday, Numerical Logics is the contractor. Project started June 1st. PMS and the contractor discussed the data elements and made decisions on several of the ones that were uncertain from the work statement. Project is on time.

2:20 pm  **TC 4.2 developments**  

**NASA Update**  

David Westberg drafted a discussion paper on using remotely sensed data (see attached). Cornick will work with Westberg on linking remote sensed data with station data for Standard 169 updates. This topic will also be featured in the long-term research being drafted by Cornick.

**XML schema for climatic design conditions**  

The GPC 20 guideline has been approved and moved into continuous maintenance phase; Chip Barnaby and Didier Thevenard are working on a draft XML schema. Stackhouse offered a prototype from NASA’s work. The TC should expect a draft XML schema from Thevenard prior to the next meeting in Chicago.

2:30 pm  **Program**  

**Montreal, Jun 25-29, 2011** – Program items for Montreal:


- Forum: Title: *TC 4.2 will do something about the weather if you talk about it!* was not accepted. Moderator: Charles S. Barnaby

**Chicago, Jan 21-25, 2012** – Possible program items for Chicago:

- Seminar: Title: *Impacts of climate change* (tentative title) – Cornick Chair.

**San Antonio, Jun 23-27, 2012** – Possible program items for San Antonio:

- Title: *ABCs of Climatic Data* – Chair TBD

Possible speakers:
- Lott on 1981-2010 Climatic Normals, other related NCDC products,
- Crawley on ASHRAE products,
- Morris on statistics, probability, and data

Possible early papers from 1613-RP.

**Dallas, Jan 26-30, 2013** – Possible program items TBD:
2:55 pm  Standards  
Crawley

The current work plan is to replace all the data in Standard with the data in the 2009 Handbook – Fundamentals, taking the current three sections and consolidating them into one comprehensive data set. Annual and monthly long-term precipitation data will be added to the station data as well as climate zone information for all stations. First draft of precipitation data is ready and draft climate zone maps and tables can be made. Maps will be contour maps for continents and large countries except for the US. The US will be zoned by county boundaries as in the previous map. A committee draft will be produced by early 2012.

3:10 pm  Old business  
Cornick

TC Web Site  
Thevenard

Thevenard reported that the web site is up to date. Thanks to Didier for keeping the website current.

Google Group/Site  
Google Group and Site are up to date. Thanks to Didier for maintaining these sites.

3:20 pm  New Business  
from the Floor

None.

3:30 pm  Adjournment  

Morris moved and Barnaby seconded to adjourn the meeting, seconded by Baltazar. Meeting adjourned at 3:20 PM

3:30 pm  Executive Session  
The recommendation made by the PES was accepted by the Committee.

Next meeting: Chicago, Illinois, Tuesday 24th January 2012

Minutes prepared by Dru Crawley, TC 4.2 Secretary
ASHRAE TC 4.2 Climatic Information

TC 4.2 Action Item Summary

Montreal (June 2011)

<table>
<thead>
<tr>
<th>Item</th>
<th>Who</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 4.2 members to review Long-term research plan and provide comments back to Cornick</td>
<td>TC 4.2 Members</td>
<td>Pending</td>
</tr>
<tr>
<td>Inform ASHRAE Publications that TC 4.2 agrees to remove WYEC2 CD from the bookstore.</td>
<td>Cornick</td>
<td>Pending</td>
</tr>
<tr>
<td>Request information from ASHRAE Publications on the sales of the Design Weather Sequence Viewer and Extreme Weather Sequence Generator CDs.</td>
<td>Cornick</td>
<td>Pending</td>
</tr>
<tr>
<td>Work with NASA to link remote sensed data with station data for Standard 169 updates in progress</td>
<td>Cornick</td>
<td>Complete</td>
</tr>
</tbody>
</table>

Las Vegas (January 2011)

<table>
<thead>
<tr>
<th>Item</th>
<th>Who</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propose an updated outline for Chapter 14 for the 2013 Fundamentals.</td>
<td>Morris, Lott, and Thevenard</td>
<td>Pending</td>
</tr>
<tr>
<td>Solicit comments from other TCs on new material in Chapter 14 of the 2009 Fundamentals.</td>
<td>Cornick, Thevenard</td>
<td>Pending</td>
</tr>
<tr>
<td>Have a technical editor review Chapter 14 for editorial issues and flow.</td>
<td>Lott</td>
<td>Pending</td>
</tr>
<tr>
<td>Propose set of names for XML schema for climatic design conditions for Montreal.</td>
<td>Barnaby, Thevenard</td>
<td>Pending</td>
</tr>
<tr>
<td>Submit seminar: <em>Impacts of Climate Changes</em>. Chair: Steve Cornick for Chicago</td>
<td>Cornick</td>
<td>Pending</td>
</tr>
<tr>
<td>Submit seminar: <em>ABCs of Climatic Data</em>. Chair: Crawley for San Antonio.</td>
<td>Crawley</td>
<td>Pending</td>
</tr>
<tr>
<td>RTAR and WS for updating the data in the 2017 Handbook by Montreal</td>
<td>Morris</td>
<td>Pending</td>
</tr>
</tbody>
</table>
Report from the Chair
1:00 – 3:30 PM, Tuesday, 28th June 2011
Hilton Bonaventure Hotel, St. Lambert Room (Lower Level) Montreal Quebec
Steve Cornick

SECTION MBOs – 4 main section MBOs:

1. Improve website performance; 46% of the TCs have active websites – the goal is 60%. Our section is well above the goal; 100%. The biggest gap in our section is the posting of current minutes.
2. Maintain the MOP
3. The TCs should review the roster rollover procedure and make suggestion – keeping in mind what is feasible for ASHRAE
4. 95% of the roster rollover sheets in by midnight on the Tues of each meeting. There was a question of obtained historical rosters – for use in tracking members history

Announcements/Reminders:

1. 11-12 Roster Access and Distribution
   Remember, the 2010-2011 Roster is in effect until after the Montreal meeting. The new rosters for 2011-2012 will go into effect on July 1, 2011 based upon the update information that each TC turned into their section head last January.

2. The TC/TG/TRG Manual of Procedures (MOP) has been revised to include a new committee type, Multidisciplinary Task Groups (MTGs). MTGs are different from TCs, TGs, and TRGs. The objective of the MTG is to first try and better coordinate and focus the activities of the affiliated TC and non-TC groups (EHC, REF, SSPCs, outside groups, etc) that make-up the MTG on the task for which the MTG was created without duplicating the functions of a TC or TG so that the task can be completed as efficiently as possible. In special cases, MTGs may be authorized by TAC to assume some TC/TG functions, such as research, if it is deemed necessary to better complete their task assignment. Since the need, purpose, and progress of each MTG is reassessed and reaffirmed by TAC each year, there are no term limits for the MTG Chair, Vice Chair, Members and Alternates.

   The Tech. Council Steering Committees on Building Information Modeling (BIM), and Building Performance Metrics, have now been converted by TAC into two new MTGs starting July 1, 2011. TAC has also approved since the Las Vegas meeting the formation of the following two new MTGs:

   MTG.EEC  Energy Efficient Classification of General Ventilation Air-Cleaning Devices
   MTG.ET  Energy Targets

4. CEC proposed or recently implemented technical program changes
   CEC is working on ways to improve the quality of the technical program and they would like suggestions from the TCs on what parameters should be used by end users to rate and evaluate program sessions at the meeting.

5. ASHRAE Google Sites & Groups tools for TCs/TGs and TRGs
   Other tools that ECC is recommending that TCs use for their online collaboration space instead of a password protected “Members Only” folder on their TC website is Google Groups and Sites. Among other benefits, all members of the Google can post new information to the Site instead of just the TC webmaster.

6. Hightower Award Nomination Process and Deadline
   Nominations for the 2011-2012 George B. Hightower Technical Achievement Award are due to your Section Head by September 1, 2011. The award recognizes outstanding technical leadership and contributions on a TC/TG/TRG during the past Society year, excluding research and standards activities. Please go to the following link to learn more about the award:

7. Upcoming Workshops and Conferences:

8. Upcoming Program Dates
   Chicago Meeting - January 21-25, 2012
   • Theme: High Performance Buildings, Integrated Design, Energy Modeling and Specialized Applications
   • Conference Paper Abstract/Full Technical Papers due April 18, 2011
   • Conference Papers Submitted for Review are due July 8, 2011
   • Chicago Seminar and Forum Session Proposals are due August 12, 2011
   • Conference Website: [http://www.ashrae.org/chicago/](http://www.ashrae.org/chicago/)

   San Antonio Meeting - June 23-28, 2012
   • Conference Site Live: June 20, 2011
   • Conference Paper Abstract/Full Technical Papers due September 26, 2011
   • San Antonio Seminar and Forum Session Proposals are due February 13, 2012
   • Conference Website: [http://www.ashrae.org/sanantonio/](http://www.ashrae.org/sanantonio/)
TC/TG/TRG Activity Feedback Form

Please provide feedback on your TC/TG/TRG activities and return this form to your Section Head by email or drop off a printed copy in the Section Head’s mailbox folder outside the ASHRAE Headquarters Room by Tuesday night 9:00 pm.

<table>
<thead>
<tr>
<th>TC# 4.2</th>
<th>Committee Name: Climatic Information</th>
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<tr>
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<td>Chair: Steven M. Cornick</td>
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Meeting was Held (City) Montreal, Quebec (Day) Tuesday (Date) 28th June 2011

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<td>Members Non-quorum</td>
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<td>Corresponding Members</td>
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<th>Current Research Activities (active)</th>
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<tr>
<td># of active RTARS</td>
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<td>1413-TRP</td>
<td>1477-RP</td>
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<td>1561-WS</td>
<td>1613-TRP</td>
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<tr>
<td>1610-WS</td>
<td>1494-RTAR</td>
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Any requests of the Technical Activities Committee?
AGENDA

Research Subcommittee

ASHRAE TC 4.2 Climatic Information
4:15-6:00 pm, Monday, June 27th, 2011
Hilton Bonaventure, St. Lambert (Lower Level)
Montreal, Quebec

4:15 Call to order / introductions / changes to the agenda
Crawley

4:20 Active Research Projects

- 1413-TRP Developing Standard Procedures for Filling Weather Data-Gaps During Analysis of Measured Building Energy Use
  choose bidder
  Thevenard

- 1477-RP Development of Typical-year Weather Files from the ISH Data Base
  Of Historical Weather Data for 2,500 International Locations
  Crawley

- 1613-RP Update Climatic Design Data in Chapter 14 of the 2013 Handbook of Fundamentals
  Morris

4:50 Draft Work Statements (on Research Plan or submitted)

- 1561-RTAR Procedures to Adjust Observed Climatic Data for Regional or Microclimatic Variations
  Submit WS by 15 August 2010 or it will be dropped, and get bids by 1 October 2012 or it will be dropped permanently
  Cornick

- 1610-WS Development of a Transposition Model for Clear-Sky Solar Irradiance
  Thevenard

5:00 Research Topics

- 1325 replacement including ISD/ISH and updated CWEEDS
  Cornick

- Other topics

5:20 Research Plan 2011 / 2012

- Review TC 4.2 research topics
  RTARs and WSs can be submitted 3 times a year—six weeks before Winter and Annual meetings and 1 August.

  - Long-term research plan
  - NASA satellite data
  - Meso Scale modeling
    All
    Cornick
    Cornick

5:45 Old Business

- CEC weather data update
  Huang

- GPC 20 XML Definitions / gbXML / Climatic Data Definitions
  Barnaby

5:55 New Business

6:00 Adjourn

Next Meeting: January 23, 2012, Chicago Illinois
(Draft) Long-term research plan for TC 4.2 Climatic information

Objectives

The objectives of the long-term research plan are: in order of priority:

1. To increase the global coverage in the Handbook – Fundamentals (HOF) and Std. 169. There are currently over 5500 locations in the 2009 HOF. It is expected that the 2013 HOF will have about 10% more. This still leaves large tracks of the world not covered by HOF and Std. 169 data; Africa, South America, and large parts of Southwest Asia especially. The long-term objective is to have over 10,000 stations in the HOF and Std. 169 for the 2021 with most of the new stations being in the areas where there is a lack of coverage.\(^1\)

![Global distribution of HOF stations](Image)

2. To develop a methodology and ability to generate future design data with associated likelihoods – Currently designers use the current HOF data which is based on recent historical data. In order to be able to take climate change into consideration it might be useful to generate estimates of future weather or climate conditions. Include some future design parameters by 2021 in HOF and Std. 169.

3. To develop effective delivery mechanisms for HOF and Std. 169 – The current paper based or electronic analogies of paper based delivery will be increasingly obsolete in a connected world. The objective is to have an online line database of weather that can be queried by humans or machines for the 2017 HOF. Users should be able to generate their own design data from the database including the standard design data defined by the HOF, TMY type data, as well as custom design data and custom weather years.

Objective 1: Increase the coverage in the Handbook – Fundamentals and Std. 169 – 10,000 stations in 2021.

Measured data – For the most part design data in the HOF are derived from surface observations, specifically the ISH database available from NCDC. Although there are many stations in the world many of them do meet the

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\(^1\) “Several years ago, Dr. John Page, a contractor for the World Meteorological Organization (WMO), indicated that THERE IS A STRONG NEED FOR KNOWLEDGE OF THE ASHRAE BUILDING CODES IN RURAL REGIONS OR TOWNS THAT DO NOT HAVE A WEATHER STATION. His estimates were (1) 500 million people live under ASHRAE conditions, (2) 2 billion people live in buildings with no systematic energy supply, and (3) another 2 billion people are using four times as much energy for heating and cooling due to poor thermal conditions in their existing buildings. Another 2.5 billion people are somewhere in the middle with little or no air conditioning. While these numbers are not precise, they suggest that there are major problems with living conditions for a large number of people in rural regions.”
currently accepted criteria for inclusion\textsuperscript{2} in the HOF. In some cases there are no data at all or the information is not made available. Some of the data in the HOF are obtained from remote sensing, satellites, such as the $\text{Ta}_b$ and $\text{Ta}_d$ values for solar.

One method of providing more coverage might be to combine remotely sensed data or other gridded datasets with surface observations and thus give more coverage with a heterogeneous data set. An example of this is the precipitation data set for Std. 169 uses a combination of two surface measured data sets, one comprising point sources the other gridded, and a satellite measured data set. The current method simply uses remote sensed data or gridded data for a location where there is no surface data. The cell which contains the location is used to obtain the data.

Some of the challenges are to:
1. Obtain long-term remotely sensed data or gridded datasets,
2. Match the period of record with the surface record,
3. Determine the appropriate spatial resolution to account for local effects.

To achieve the objective it will be necessary to integrate the current surface observations with several other sources including but not limited to:
1. Remotely sensed data (NASA satellite data for e.g.),
2. Gridded data sources (GPCC for e.g.),
3. The Weather Underground;

to produce a heterogenous data set that could give worldwide coverage.

The plan is to generate a series of RTARs, work statements, committee studies or partnerships to develop a strategy for combining data and subsequently expanded HOF coverage.

**Current work**

Already, the Technical Committee has been working with NASA on these issues, specifically looking at climate zoning al la Briggs\textsuperscript{3}. To go further on 26-October 2010 it was suggested that we present to NASA a subset of elements and see if they can produce a global map using a 10min grid. From the June 2010 report\textsuperscript{4} it seems that NASA can produce the following.

1. Annual and monthly mean dry bulb
2. Annual and monthly mean precipitation
3. Daily min and daily maximum temperatures
4. HHD18 and CDD10
5. 22 years of data can be produced.

What items does the committee want to see?
1. 99\% Dry Bulb for the coldest month
2. 1\% Dry Bulb for the warmest month
3. 1\% Wet bulb temperature for the warmest month (MCBD too?)
4. HDD18
5. CDD10
6. Monthly DB daily stats; min, max, mean, std dev plus annual
7. Monthly precipitation totals stats; min, max, mean, std dev, plus annual
8. Others?

\textsuperscript{2} The criteria are summarized in TC 4.2 FAQ #7
\textsuperscript{3} See NASA’s January 2011 report to the TC at the Las Vegas winter meeting.
\textsuperscript{4} See NASA’s June 2010 report to the TC at the Las Vegas winter meeting
A NASA study (ASHRAEJune2010Rpt) showed that it was possible to generate reasonable estimates of surface data – for individual years on a 10 minute grid. Elements such as mean annual and monthly precipitation, temperatures, mean, max, mean, as well HDD18 and CDD10 can be reliability generated. NASA claims to be able to generate data based on up to 22 years of data. Climate zone maps have been successfully generated.

An immediate goal would be to augment the surface data with NASA satellite data.
1. Identify the minimum set of elements that are absolutely necessary for HVAC design
2. Determine what elements can be produced from satellite data
3. Determine if the missing elements, if any, can be estimated from the satellite data or a combination of satellite and surface data.
4. Estimate the reliability of the remote sensed estimates
5. If feasible figure out how to deliver the data – a point and click interface for example on 10 minutes gridded map.
6. Can we spot check with the “weather underground?”

**Modelled data** – A different approach to expanding the coverage in the HOF would be the integration of modelled data with surface observations to produce design data. The idea here is that where there is no measured data available data available or there are some significant local effects then long-term data and hence design data could be modelled and verified with some nearby measured data or sparse data at the site. 1561-WS Procedures to Adjust Observed Climatic Data for Regional or Mesoscale climatic Variations is the first step along this path. The project proposes developing a methodology to generate data that considers local mesoscale climate effects. More generally the work involves filling/generating weather data for various gaps lengths with varying amounts of measured, remotely or surface, data.

**Current work**

Current projects along this long are listed below:
1. 1561-WS Procedures to Adjust Observed Climatic Data for Regional or Mesoscale climatic Variations (work statement phase)
2. 1494-RTAR Procedures to Generate Hourly Climatic Data from Sparse Data Sets (shelved temporarily)

**Objective 2: To develop a methodology and ability to generate future design data with associated likelihoods**

The current data in the HOF and Std. 169 are based on the previous 25 years of historical data. For example the 2009 HOF data are derived from 1985-2005 NCDC data. Recently designers and codes and standard writers have been concerned with future trends. Would it be possible to include some future design data in the HOF that would fall within the design life of buildings and equipment? There are three ways to produce future climate and design data:
1. Statistical and/or stochastic methods
2. Morphing methods
3. Regional or Meso-scale modeling methods

The last method is similar to idea of using Regional Climate Models (RCMs) to generate historical data. Instead of backcasting to generate past data the RCM operates in a forecasting mode and generates a string of data from which design data or TMY type data can be generated. The RCMs would be seeded with data from Global Climate Models and different scenarios taken from the IPCC scenarios. Of crucial importance is the ability to estimate the likelihood of occurrence or probability of the future data or bound it within a confidence interval.

**Current work**

There are no current projects in this area.
Objective 3: Develop effective delivery mechanisms for HOF and Std. 169

The ultimate goal would be to deliver all the HOF and Std. 169 climatic data using an on-line interface to a database housed in the Cloud. Obviously a minimum amount of printed or electronically printed data would be retained in the form of database reports. The data would be stored in a BIM compatible format, XML, and users could obtain standard forms of data, 1% dry-bulb for example, or custom design data by constructing user specific queries. Similarly users should be able to obtain standard TMY type data or generated custom TMYs or custom sets of weather data from the hourly data. Ultimately this would also serve as the interface to modelled data. The interface should also be easily access in real time by other computer programs.

Current work

Draft of XML names, definitions, and schema for the current HOF data is pending.

Action items:

Objective 1: Increased HOF Coverage
1. A meeting is planned for the 2011 annual meeting in Montreal with NASA to discuss future work in the area of augmenting surface data with satellite data. An outline and talking points will be produced prior to the meeting. Expected outcome – Possible RTAR.
2. 1413-TRP-R has gone out to bid.
3. 1561-WS was submitted to RAC on May 15th 2011 and will be discussed again in Montreal.
4. Global precipitation and climate zone tables and maps will be published in Std. 169-2011.

Objective 2: Future Years
1. Set up an electronic work area, a Google Site amongst interested parties, ASHRAE TC 4.2, Iowa State, for example, to develop potential projects for generating future years.
2. Define how the use of predicted data can be justified from various perspectives: engineering, economic, regulatory, and legal.

Objective 3: Efficient Delivery
1. Draft of XML names, definitions, and schema for the current HOF data for Montreal.
2. Toy database of hourly weather database with some basic design data queries.
17 June 2011
Augmenting surface data with satellite data
Outline for discussion about NASA data in Montreal
Use of and Incorporation of NASA Gridded data into ASHRAE Climatic Data

1. ASHRAE Climatic Data
   a. Handbook – Fundamentals (HOF)
      i. Design data

The design data consists of data derived from hourly (or sub-hourly) data for specific points. Binned data is also available from the Weather Data Viewer.

b. Standard 169 – and related standards
i. Design Data – Std 169 contains largely the same design data as the HOF). This is done to make the standard available to other standards that require a public review process.

ii. Climate zoning data – this data is maintained to support standards that use the IECC Climate zone definitions – such as 90.1. This includes data described above (Degree-days) plus mean monthly and annual rainfall statistics.

c. What other data do we publish at ASHRAE?

2. ASHRAE data cover is dense in some areas; thin to non-existent in others.

3. NASA data – products
   a. MERRA
      i. 1-degree precipitation.
      ii. Much more

4. Integration of gridded data within ASHRAE Data
a. The next version of STD 169 integrates GPCC ¼ degree gridded data with surface data for climate zoning for point locations. Maps were developed from the Std locations in house.

b. Long collaboration with LARC; Crawley sponsored some work through DOE. The final report is posted to the Google Site. ASHRAEJanuary2011Rpt_final.doc. Results have yet to be incorporated.

5. What do we want at ASHRAE?
a. To be able to obtain design data for any location worldwide - i.e. grid value for location within the grid; design conditions are required. (Long-term research plan Objective 1.)
b. Integrate gridded data with surface data to produce maps; either climate zones or design data.
c. Use satellite data as seed values or checks for generating modeled hourly data – historical or future data.
d. Can NASA calculate the 1% dry bulb for a number of US locations that appear in the handbook?
e. Anything else?

26-October 2010
It was suggested that we present to NASA a subset of elements and to see if they can produce a global map using a 10 min grid.

From the June 2010 report it seems that NASA can produce the following.

1. Monthly mean dry bulb
2. Monthly mean precipitation
3. Annual mean dry bulb
4. Annual mean precipitation
5. Daily min and daily maximum temperatures
6. HHD18 and CDD10

Is this correct, have I missed any? It was suggested in a private communication that 22 years of data could be produced.

What items does the committee want to see?

1. 99% Dry Bulb for the coldest month
2. 1% Dry Bulb for the warmest month
3. 1% Wet bulb temperature for the warmest month (MCBD too?)
4. HDD18
5. CDD10
6. Monthly DB daily stats; min, max, mean, std dev plus annual
7. Monthly precipitation totals stats; min, max, mean, std dev, plus annual
8. ???

Elements should be derived from a minimum of 8-years of data should go no further back than 25 years from 2006 – the end date for the current data.
Grid should be lapse rate corrected at 10 min.

25-October 2010
Research Topic: Augmenting surface data with satellite data

There are significant areas of the world without measured surface data. “Several years ago, Dr. John Page, a contractor for the World Meteorological Organization (WMO), indicated that THERE IS A STRONG NEED FOR KNOWLEDGE OF THE ASHRAE BUILDING CODES IN RURAL REGIONS OR TOWNS THAT DO NOT HAVE A WEATHER STATION. His estimates were (1) 500 million people live under ASHRAE conditions, (2) 2 billion people live in buildings with no systematic energy supply, and (3) another 2 billion people are using four times as much energy for heating and cooling due to poor thermal conditions in their existing buildings. Another 2.5 billion people are somewhere in the middle with little or no air conditioning. While these numbers are not precise, they suggest that there are major problems with living conditions for a large number of people in rural regions.” Data coverage for the 2009 HoF and upcoming Std 169-2011 indicates large areas with sparse to no data.
A NASA study (ASHRAEJune2010Rpt) showed that it was possible to generate reasonable estimates of surface data – for individual years on a 10 minute grid. Elements such as mean annual and monthly precipitation, temperatures, mean, max, mean, as well HDD18 and CDD10 can be reliability generated. NASA claims to be able to generate data based on up to 22 years of data. Climate zone maps have been successfully generated.

The goal would be to augment the surface data with satellite data.

- Identify the minimum set of elements that are absolutely necessary for HVAC design
- Determine what elements can be produced from satellite data
- Determine if the missing elements, if any, can be estimated from the satellite data or a combination of satellite and surface data.
- Estimate the reliability of the remote sensed estimates
- If feasible figure out how to deliver the data – a point and click interface for example on 10 minute gridded map.