

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

1791 Tullie Circle, N.E./Atlanta, GA 30329  
**404-636-8400**

TC/TG/TRG MINUTES COVER SHEET

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

TC/TG/TRG NO TC 3.1 DATE 15 MAY 2009

TC/TG/TRG TITLE Refrigerants and Secondary Coolants

DATE OF MEETING 26 January 2009 LOCATION Chicago, IL

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Sean Cunningham (Chair) - <u>voting</u>	07/2008	William Walter – <u>voting</u>	07/2008	Kirsten Ahrens Dorf - Guest
David Wilson (Vice Chair) – <u>voting</u>	07/2008	Karim Amrane –CM		Hank Bagheri - Guest
Debra Kenroy (Secretary) – non-voting CM	08/2008	John Andrepont –CM		Donna Bossman - Guest
Don Bivens (Research) – <u>voting</u>	07/2008	Earl Clark –CM		Makoto Kaibara - Guest
Kevin Connor (Handbook) - <u>voting</u>	07/2006	Thomas Clemens – CM		Umar Khokhar - Guest
Felix Flohr – <u>voting</u> (international)	07/2007	Denis Clodic - CM		Björn Palm – Guest
Gustavo Rolotti – <u>voting</u>		Alan Cohen –CM		Chris Seeton - Guest
Samuel Sami (Program) - <u>voting</u>	08/2008	Barry Fields – CM		John Senediak - Guest
Ganesan “Sonny” Sundaresan (Journal) - <u>voting</u>	07/2007	Cynthia Gage –CM		Will Stoecker - Guest
James Lavelle (Standards) – non-voting CM	07/2008	Richard Jacobsen – CM		Kenji Takizawa - Guest
Barbara Minor (Webmaster) – non-voting CM	07/2006	Dominic Kolandayan - CM		
Robert Doerr - CM	07/2008	Kenneth Lilje –CM		
Osami Kataoka – CM		Bert McJimsey – CM		
Georgi Kazachki - CM		Nandini Mouli - CM		
Steve Kujak – CM		Thomas Reinarts – CM		
Mark McLinden – CM		Rajiv Singh – CM		

Sunil Nanjundaram – CM		Steven Szymurski – CM		
Robert Richard - CM		Koichi Watanabe – CM		
		Thomas Watson – CM		
		Andrzej Wesolowski – CM		
		Xiaomei Yu – CM		
		Jing Zheng – CM		

### KEY CONTACTS

SPLS Liaison*	Janice Peterson
TAC Section Head:	Brian Michael Silvetti
TAC Chair:	Dr. Bryan Becker
All Committee Liaisons As Shown On TC/TG/TRG Rosters:	RAC Research: Raymond Cohen Special Pubs: Harvey Sachs Standards: Katherine Hammack Program: Brian Wandling Handbook: Walter Grondzik Chapter Technology Transfer: Nancy Mitchell-Veeck Professional Development: Tim McGinn
Manager Of Standards* Manager Of Research & Technical Services	Stephanie Reiniche Mike Vaughn

\* receives a copy of the TC 3.1 meeting minutes

**1. CALL TO ORDER** (Sean Cunningham, Chair)

- A. Introductions of members and guests – Chair called the meeting to order at 3:45 P.M. and attendees introduced themselves.
- B. Agenda Revision/acceptance – Agenda was accepted as modified (7-0-0).
- C. Establishment of a quorum – There were 9 voting members present out of 9 at the outset of the meeting, which did constitute a quorum.

Voting members for this meeting:

Don Bivens  
Kevin Connor  
Sean Cunningham  
Felix Flohr  
Gus Rolotti  
Samuel Sami (arrived 3:55)  
Sonny Sundaresan (arrived 4:00)  
Bill Walter  
Dave Wilson

**2. APPROVAL OF 23 JUNE 2008 MEETING MINUTES**

Motioned and seconded to approve the minutes as amended. Motion passed (7-0-0).

**3. CHAIRMAN'S ANNOUNCEMENTS** (Sean Cunningham)

- A. Hightower Award reminder
- B. Roster update process  
New category: provisional corresponding member
  - An interested individual can contact ASHRAE and they will add their name immediately as a provisional corresponding member.
- C. Climate 2010 in Turkey - looking for papers
- D. TC Rule Clarification
  - A member cannot call in on a phone in order to be considered as participating in a meeting.
- E. TC 3.1 Roster Review
  - No one rolls off immediately after the June 2009 meeting.

#### 4. RESEARCH SUBCOMMITTEE (Don Bivens)

##### A. Report from Research Subcommittee Chairs Meeting

- Research Advisory Panel
  - ASHRAE members were surveyed for topics of interest
  - Top 10 categories were selected for expansion
    - Goal: focus broader objectives
    - 3 topics are designated for TC 3.1 and we need liaisons
    - Natural Refrigerants is one of the topics and S. Sundaresan and D. Bivens volunteered to be liaisons.

##### B. Completed Research Projects

none

##### C. Ongoing Projects

WS-1507 (Binary Refrigerant Boundary Concentrations)

- R. Richard is primary contact. The intent is to send out for a re-bid.
- The Work Statement was approved. Rewriting was done to modify the scope in order to clarify what is meant and needed.
- Vote to approve: 8-0-0

1484RP (Energy and Performance of Secondary Coolant Low Temperature Refrigeration Systems)

- Work is being performed at Purdue University – A short update presentation on progress was given.
- Requested a time extension due to delay in starting with the project to be completed by 31JUL09. No cost extension.
- Vote to approve time extension: 8-0-0

##### D. RTARS

RTAR #1 - Assessment of Burning Velocity Test Methods

- Note: 2 methods under consideration, tube approach and sphere approach, which may require 2 contractors
- Priority: 1
- Vote to approve: 8-0-0

RTAR #2 - Assessment of Alternative Approaches to Predicting the Burning Velocity of a Refrigerant

- Priority: 4
- Vote to approve: 8-0-0

RTAR #3 - Risk Assessment of 2L Flammable Refrigerants in Stationary Applications

ASHRAE TC3.1-Refrigerants and Secondary Coolants  
Final Minutes – January 2009 (Chicago, IL)

- Priority: 2
- Vote to approve: 8-0-0

RTAR #4 - Risk Assessment of 2L Flammable Refrigerants in Commercial Refrigeration

- Priority: 3
- Initial vote to approve: 2-2-4
- Final vote to approve: 3-2-4
- Note: Formal reasons for negative votes and abstentions were not requested however, the general opinion expressed was the fact that this RTAR was developed and presented verbally during the meeting with no paper copies available for review. Some were hesitant to vote in favor without seeing the RTAR in writing.

E. S. Sami suggested assembling an RATR for the identification of new fluids but would like assistance. D. Bivens volunteered to help.

**5. HANDBOOK SUBCOMMITTEE (Kevin Connor)**

A. Status Report

TC 3.1 owns 3 chapters

- Galley proofs were reviewed and approved.
  - Chapter 19 – B. Minor
  - Chapter 20 – M. McLinden
  - Chapter 21 – K. Canon

ASHRAE needs to cut back on handbook size due to costs. It may be possible to remove some fluids from Chapter 20. However, all information can be included on the CD version. K. Connor will update ASHRAE.

**6. PROGRAM (Sam Sami)**

A. Chicago, 24-28 January 2009

i) Seminar 46 – co-sponsor of “CO<sub>2</sub> Systems, Components, and Applications” (Held on 27JAN09)

B. Louisville, 20-24 June 2009: Program packages due first week of February 2009  
Technical/Symposia papers due September 2008

- i) Forum: ISO 817. Chairman Bill Walter
- ii) Seminar: CO<sub>2</sub> System Performance and Applications - co-sponsor with TC 10.7
- iii) Seminar: R-22 Retrofit of R-22 in A/C
  - a. Presenters include National Refrigerants, Arkema, and DuPont
  - b. Titles and abstracts due to S. Sami by 06FEB09

ASHRAE TC3.1-Refrigerants and Secondary Coolants  
Final Minutes – January 2009 (Chicago, IL)

- C. Orlando, 23-27 January 2010: Program packages due first week in August 2009. Technical/Symposia papers due April 2009. (Note: S. Cunningham to confirm timing and relay information to committee.)
- i) Seminar: ISO 817. Chairman Bill Walter. (confirm with Bill in June 2009)
    - a. Previously discussed 2 seminars for Orlando: ISO 817 and burning velocity. Decision made to combine these into a single seminar.
  - ii) Seminar: Advances in Refrigeration and Secondary Coolants. Chairman Sam Sami.
    - a. Volunteers: Purdue University, K. Connor, G. Rolotti
  - iii) Forum: ASHRAE Standard 34 400 and 500 Series Blends – Do We Need the Distinction? Chairman Dave Wilson.

Motioned and seconded to approve the program plan as written. Motion passed (8-0-0).

## 7. **STANDARDS** (Jim Lavelle)

- A. SPC-177P for Measuring Fractionated Compositions of Refrigerant Blends (Bob Richard)

GC procedure and draft for fractionation – June 2009 meeting

- B. ASHRAE Standard 34, *Designation and Safety Classification of Refrigerants* (Bob Doerr)

- Meeting of full committee immediately after this meeting. Under consideration are 4 Continuous Maintenances design to align ASHRAE Standard 34 with ISO 817.
- Other topics:
  - Proof that a refrigerant is an azeotrope
  - Retire the 500 Series concept
  - Nomenclature of olefins

- C. ISO Standard 817, *Refrigerants – Number Designation* (Bob Doerr)

Final Stages. Soon to go out to ballot. Final vote anticipated in 2010

## 8. **WEB SITE** (B. Minor)

B. Minor agreed to assume this and is on a learning curve

Will add Toxicity and ATEL software to the website.

**9. OTHER BUSINESS**

The publications Committee requested a survey on whether to retire the ASHRAE handbook. Currently 2 versions are published, SI and IP which are very expensive.

**10. MEETING ADJOURNED – 5:50 PM**

APPENDIX 1

**TC 3.1 RESEARCH PLAN (2008 – 2009 - 2010)**  
**With modifications at Chicago meeting on Jan. 26, 2009**

ASHRAE Research Projects		
	Project Title	Comments/Status
<b>2002-2003 Research Plan</b>	<b>Partitioning of Non-Condensable Gases In Refrigerant Liquid &amp; Vapor Phases (1303-TRP)</b>	Project completed. R.C. Cavestri PI. <u>Minor</u> , Rolotti, Richard - PMS. Poster presentation at Salt Lake City meeting.
<b>2003-2005 Research Plan</b>	<b>Identification And Evaluation Of Working Fluids For High Temperature Heating Applications. (1308-TRP)</b>	Project completed. Steven Brown PI. <u>Minor</u> , Watson, Meurer, Pucciano (TC 9.4) – PMS. Poster presentation by Brown at Salt Lake City meeting.
2006-2008 Research Plan	<b>1507-RFP: Binary Refrigerant Flame Boundary Concentrations</b> and databank for useful binary pairs in commercial refrigerants (60 C and 100 C). Identify standard flammable mixture for confirming accuracy of data from flame test apparatus. To aid assessment of new refrigerant blends for SSPC 34.	Project to be rewritten with clarified work statement. Committee: <u>Bob Richard</u> , Debra Kennoy, Sonny Sundaresan, and Tom Leck as PMS.
2006-2008 Research Plan	<b>1484-RP: Energy and Performance of Secondary Coolant Low Temperature Refrigeration Systems</b> – Literature Research and Industry Review (includes model identification and verification vs operating systems)	Project underway. Eckhard Groll – PI, with <del>Francisco Mentel</del> /Joe Poland. <u>Kevin Connor</u> , Xudong Wang, D. Bivens, and David Hinde (TC 10.7) as PMS
Priority	<b>(Potential research projects)</b>	
	Burning Velocity Method Survey and Cost, Error, and Ease of Use Analysis	To provide method evaluation and burning velocity data with error analysis for flammable refrigerants, to be used in future risk assessments and flammability classification methodology (as in ISO 817). RTARs being written by Minor and Kennoy
1	<b>RTAR: Assessment of Burning Velocity Test Methods</b>	
3	<b>RTAR: Assessment of Alternative Approaches to Predict Burning Velocity of a Refrigerant</b>	
2	<b>RTAR: Risk Assessment of 2L Flammable Refrigerants in Stationary Applications</b> a) residential a/c & heat pumps b) commercial refrigeration	Stationary refrigeration & a/c applications, risk assessment, what constraints on systems for safe use such as ventilation, charge size, electrical, etc. a/c RTAR by Minor. Comm.. refig. RTAR by Sundaresan
On hold pending SPC 177P	Fractionation testing and error analysis for refrigerant blends (supports SSPC 34)	Continuing on hold until new SPC 177P (MOT Fractionation Measurement of Refrigerant Blends) committee determines if need for further research. Robert Richard to report at June Louisville meeting; possible RTAR

**TC 3.1 Non-prioritized Research Suggestions**  
**Updated Jan 26, 2009 at Chicago meeting**

<b>Non-Prioritized Research Projects (long range)</b>		
	Secondary fluids for refrigeration: properties of low temperature secondary coolants such as formate/acetate water solutions .....reconsider after completion of 1484-RP	Property data in vendor literature, but wide variation in values, possibly due to additives, and/or analytical procedures.
	Identification of new fluids for high temperature energy conversion applications (CHP/ organic Rankine cycle); also low grade heat recovery	Identify TCs with interest in CHP to determine fluid needs (TCs 1.1, 1.3, 1.10). Assistance by Dr. Sami
	What are required properties needed to design equipment and rooms for use of flammable refrigerants	Check upcoming draft of Std 15 being revised for use of A2 & A3 refrigerants
	Low GWP refrigerant properties, stability, materials compatibility – receive summary of papers on this topic scheduled for NIST conference late June, 2009	Would be a testing program; delay consideration for 6-12 months for availability of low gwp refrigerants
	Ice Slurry Properties.....Thermal Storage	Check TC 6.9 for need
	Lubricants for carbon dioxide	TC 3.4 preparing RTAR
	Survey and model development for surface tension data for refrigerant mixtures – determined to be not needed, January 2008	delete