

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

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TC/TG/TRG MINUTES COVER SHEET

TC/TG/TRG No. TC5.6

DATE: January 29, 2007

TC/TG/TRG/TITLE: Control of Fire and Smoke

DATE OF MEETING: January 29, 2006

LOCATION: Dallas , TX

VOTING MEMBERS PRESENT	YEAR APPT'D	VOTING MEMBERS ABSENT	YEAR APPT'D	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Paul Turnbull (Chair)	2005	Greg Sanchez	2006	David Banks, CM
John Clark	2004			Mark Belke, Guest
Dick Graves	2005			James Buckley, CM
George Hadjisophocleous	2006			Tim Busby, Guest
Roger Lichtenwald	2005			Sean Cassidy, Guest
Gary Loughheed	2006			Stephen D Cary, CM
Paul Miclea	2003			Bob Dittrich, CM
Tim Orris	2006			Ian Duckworth, Guest
Jeffrey Tubbs	2005			Larry Felker, CM
Bob Van Becelaere	2005			Marty Gissel, Guest
Robert Wasilewski	2005			Joe Gonzales, CM
William Webb	2005			Kai Kang, CM
				Ahmed Kashef, CM
				Jerry Kettler, Guest
				John Klote, CM
				Valentina Nedelcu, Guest
				Dan Rau, Guest
				John Rodriguez, Guest
				Ray Sinclair, CM
				Robert Smith, Guest
				Tenison Stone, Guest

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<i>All Members of TC/TG/TRG plus the following:</i>	
TAC Section Head:	Gaylon Richardson
TAC Chair:	Groll Eckhard
Committee Liaisons:	Harvey Brickman Michael Circosta Julian De Bullet Kimball Ferguson John Hogan Frederick Kohloss Alan Veeck
Manager of Standards:	Claire Ramspeck (Staff)
Manager of Research & Technical Services:	Mike Vaughn (Staff)

These draft minutes have not been approved and are not the official, approved record until approved by this committee.

MINUTES
ASHRAE TC 5.6
CONTROL OF FIRE AND SMOKE
Quebec City, PQ
June 26, 2006

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1) Introductions

The Committee Chair Paul Turnbull called the meeting to order at 4:15 pm.

2) Identification of Voting Members

Voting members were identified to assist voting procedures. Twelve of thirteen members were present throughout the meeting. No international members were present.

3) Approval of Minutes from June 26, 2006 meeting (Quebec City, PQ)

The committee voted to accept the Quebec City meeting minutes with no revisions (For approval: 12; against: 0; abstentions: 0).

4) Chairman's Remarks – Paul Turnbull

Paul Turnbull welcomed the members and guests and noted that the membership roster is required to be turned in after this meeting. Paul asked that those interested in being included as corresponding members or committee members contact him or John Clark.

Paul noted that those planning to attend Long Beach may wish to confirm plans early as the ASHRAE room block rates are quite good when compared with typical rates. Reservations can be made through calling the hotel directly.

ASHRAE would like all TCs to review Handbook, research and technical program efforts to align with the ASHRAE's sustainability efforts and goals.

5) Subcommittee Reports:

a) Research – Bill Webb

The research chair reported on the following:

Research Project Overview

- **RP1247 (Balcony Spill Plumes).** Bill noted that the test work has been completed. The report has been reviewed and accepted. Papers for presentation in Dallas have been submitted to Mike Vaughn.

Vote to accept RP 1300 approved (For: 11, Against: 0, Abstentions: 1 – Gary Lougheed abstained as he was the lead investigator for this report).

- **RP1300 (Maximum Velocity of Make-Up Air in Atrium Smoke Control Applications).** This project has been awarded to Carleton University. The objective of this project is to conduct CFD modeling to evaluate the existing criterion of make-up air velocity and to determine if the 200 fpm (1 m/s) make-up air velocity limit is valid, or whether other values or methods are appropriate, and to gain an understanding of the mechanisms of smoke flow in atria when an air jet impacts a smoke plume

A draft report has been submitted to the PMS for review.

- **RP1328 (Develop Algorithms for Smoke Movement Modeling in Large, Multi-Compartment Buildings).** This project was awarded to NRC Canada.
 - Fluid flow and heat transfer subroutines for both the Network as well as for the Two-Zone models have been developed and coded in Fortran.
 - Verification of these subroutines has been done by comparing the results obtained directly from the subroutines to those from hand calculations for the same conditions.
 - Combustion, fluid flow and heat transfer subroutines for the Single Zone (Fire Compartment) model have been developed, coded in Fortran, and subsequently verified with the known conditions.
 - The transitional flows from Single to Two-Zone and from Two-Zone to Network models have been considered and the corresponding equations and subroutines have also been developed and verified.
 - These subroutines have been designed to consider the flows through both horizontal and vertical openings. They are capable of simulating the cases with multi-compartmented buildings.

Long Range Research Plan

The following long-term plans were discussed.

- **Stairwells and Open Doors.** This work statement has been assigned as RTAR 1447 and it has been returned with comments and a request for response. A response to the RAC has been submitted. From RP 1203, we learned that the pressurization air in the stairwell dilutes combustion products in the stairway significantly even with the stair door on the fire floor open. This proposes to determine conditions within the stairwell with the stairwell doors open; however, a large scale fire project would help to develop supporting data. The payoff for this project is that there is a high probability that we will learn that we do not need to design stairwell pressurization systems to maintain pressure when doors are open.
- **Long Atria.** We know almost nothing about the how long an atrium can be before the smoke exhaust approach is no longer applicable. The question is how long an atrium can be before the smoke in the upper layer tends to fall to the floor. Considering the significance of heat transfer for mechanisms involved, scale modeling is inappropriate. A project involving full scale fires would be appropriate. Michael Ferreira of Hughes Associates has performed CFD modeling for NFPA 92B on the subject. He will be submitting results to the NFPA Smoke Management Committee meeting on February 8 & 9. This may help in identifying research needs. Paul Turnbull, Gary Lougheed, John Klote or Jeff Tubbs will report to the TC after the

NFPA Smoke Management Meeting.

- **Designing smoke control systems to incorporate stack effect.** The impact of the reverse stack effect is unclear when designing natural venting smoke exhaust designs. Additionally, it is unclear at what point stairwells should be divided into multiple compartments to control stack effect in tall buildings. While this topic is of interest, a literature search would need to be performed to determine whether sufficient data already exist to answer these questions, or if a research project is required to develop this data.
- **Plugholing.** Bill noted that in the TC.6 committee discussed two methods available for calculating the affect of plugholing. Results from these two methods differ substantially. Research can be performed to review these differences and determine an appropriate approach.
- **Purging for Stairs and Elevator Shafts.** Purging for stair shafts should be a viable approach for smoke management. It was agreed that concept paper should be developed to identify and refine research needs.

Bill noted that the next step will be to develop a new set of RTARS.

b) Program – John Klote

The program chair John Klote discussed the following:

- **ASHRAE Registration Policy.** ASHRAE now has a new policy for the complimentary registration: (1) Authors for Transactions sessions – full complementary registration; (2) Seminar presenters and forum moderators – one day complementary registration for the day of the session only; (3) Seminar session chairs for Transactions and Seminars – no complimentary registration.

The Program Subcommittee requested that TC 5.6 to provide notice to the TAC that TC 5.6 strongly disagrees with the new policy on registration and that the committee formally requests to revise the policy to the previous policy. The reasons for this request are that this change will significantly affect our ability to continue to provide quality programs. The committee voted unanimously to accept a motion to move forward with this (For: 12, Against: 0, Abstain: 0). Paul noted that he will send this notice to the TAC.

- **Program Deadlines.** The following deadlines were discussed.
 - The deadline for completed program packages for the Long Beach meeting is February 9, 2007
 - The deadline for Tech papers to be reviewed for the New York Meeting is April 6, 2007.
 - The deadline for completed program packages for the New York meeting is August 3, 2007.
- **Reminder for Program Moderators.** When submitting program packages, program moderators are reminded to ask for a specific time slot and a backup time slot. Usually Sunday mornings are good times.

Planned Programs

John noted the following list of planned programs. It should be noted that the names listed below are only possible speakers or authors and these are subject to change.

- Transaction Session, Long Beach June 2007: Balcony Spill Plumes, Program Moderator – Bill Webb. Note: Some papers only had one review returned, so this session had to be delayed.

Experiments – Gary Lougheed
 CFD Modeling Entrainment and the Spill Edge – George Hadjisophocleous
 Zone Modeling & Analytical Modeling – Gary Lougheed
 CFD Modeling Overall –McCartney

- Seminar, Long Beach June 2007: Smoke Control Analysis – Back to Basics, Program Moderator – Jeff Tubbs

Algebraic Equations – Lougheed
 Network Modeling – Klote
 Zone Modeling – Webb

Note: The last few Back to Basics seminars TC 5.6 proposed did not get listed as Back to Basics. Jeff Tubbs needs to contact the Program Committee to see how we get this one accepted as Back to Basics. Further, the speakers all need to make an extra effort to focus on the basics.

- Seminar, New York January 2008: Fire and Smoke Control Dampers, Program Moderator – Paul Turnbull

Roger Lichtenwald – Installation
 Larry Felker – Actuation
 Bob Van Becelaere - Testing

- Transaction Session, New York January 2008: RP1300 – Smoke Control and Make-up Air Velocity, Bill Webb – Program Moderator

George Hadjisophocleous has agreed to write two papers. He will forward the titles to Bill Webb.

- Transaction Session, New York January 2008: Smoke Control and Evacuation, Program Moderator – Bill Webb

Overview of Emergency Evacuation – Klote
 Human Behavior in Emergencies – Proulx
 Evacuation Plans for Tall Buildings – Tubbs
 What was learned from WTC Study – Bukowski

Klote, Tubbs and Proulx have agreed to write papers. Bill agreed to contact Bukowski to see if he can participate. Bill has some other leads for authors.

- Seminar, Salt Lake City June 2008: Design and Acceptance Criteria for Smoke Control Systems, Program Moderator – TO BE DETERMINED

Possible future program.

- Transaction Session, Salt Lake City June 2008: CFD Modeling Techniques for Smoke Control, John Klote – Program Moderator

George Hadjisophocleous - Cell Sizes and CFD Modeling of Atria Smoke Control
 Kevin McGrattan - Validation of FDS
 Possibly another speaker.

John Klote will remind the authors when papers are due.

c) Membership – John Clark

John and Paul noted that this meeting is the ending date for next year's committee roster.

d) Handbook – John Clark

John Clark (Handbook Chair) noted that he had received the proofs for the 2007 handbook. John Klote, John Clark and Bill Webb have agreed to review the proofs and submit within ASHRAE's requirements.

John noted that the handbook committee welcomes any comments to help make the handbook more user friendly. Users are defined by ASHRAE as consulting engineers, contractors, manufacturers, and similar professionals

e) Guideline 5 – Bill Webb

The Guideline 5 committee met during the slot for Standards. Guideline 5 (Commissioning Smoke Management Systems) is currently an existing document., This document is being updated and revised to coincide with the Guideline 0. Guideline 0 will form the base for all commissioning documents. Guideline 0 is administered by NIBS. Guideline 1 (Commissioning HVAC Systems) is nearly complete and is currently in the final review process. The existing Guideline 5 will be revised to the new Guideline 1 and Guideline 0 format.

The committee made assignments to review the existing Guideline 5 in light of the new Guideline 1 document. Jerry Kettler (member of Guideline 1) has a standing conflict on Monday. We will revise schedule so that all can meet. The committee is accepting volunteers to assist with this effort.

John Clark noted that the Guideline 5 should recognize that the IBC requires a smoke management special inspector so that these documents do not conflict with the commissioning role.

f) Standards – Bob VanBecelaere

Bob noted that AMCA Publication 212 – Certified Ratings Program – Product Rating Manual for Smoke Management Fan Performance is available and provides requirements for several classes of fans.

g) Spec. Documents for Smoke Control Exhaust Fans – Bob VanBecelaere

It was agreed to remove item G from future agendas.

h) TC5.6 Web Site – Kai Kang

Paul noted that the section chair recognized the WEB Site for TC 5.6 for being the most up-to-date and user friendly.

i) Elevator Use During Fires – John Klote

John noted that the 2006 Edition of the IBC requires elevator pressurization systems. It is unclear if the wide range of pressure differences developed by these systems will be consistently achievable. It is also unclear the system pressurize will cause elevator shaft doors to jam. However, it was noted that, since fire-fighters will be the likely users of elevators when the pressurization systems are active, the slight issues with doors should be easily dealt with.

Jeff Tubbs noted the ASME has a committee dealing with elevator evacuation.

It was agreed that this item will be removed from future agendas.

6) Intra-Society Liaison Reports:

a) TC1.4 (Control Theory and Application) – Larry Felker

Larry noted that most of the work from the TC 1.4 committee involves control sequences and is not applicable to fire and smoke control systems.

b) TC5.2 (Duct Design) – Bob VanBecelaere

Bob noted that this committee will meet tomorrow. Nothing additional to report

c) TC5.9 (Enclosed Vehicular Facilities) – Paul Miclea

Paul noted that this committee meeting will be held tomorrow – session held this morning went well.

d) TC5.10 (Kitchen Ventilation) – John Clark

John noted that the interface between kitchen ventilation systems and the fire alarm is important, as the systems may not work as designed if supply air is not provided when systems are turned off. If the proper interfaces are not provided, exhaust quantities may not be achievable.

e) TC7.9 (Building Commissioning) – Jerry Kettler

See notes on the Standards Guideline 1

Guideline 30 (Commissioning for existing buildings) and Guideline 31 (Commissioning, Training and O&M) are available. Guideline 0 has a standing committee and this committee is evolving to an oversight committee.

TC7.9 is considering a proposal to develop a user manual for commissioning.

ASHRAE is considering the development of a certification process for hospital design, sustainability, commissioning, and building operations. There is a task group for implementation of this certification. The certification process will continue to evolve, but the current thoughts are that certifications will be provided for users of Guideline 0.

Bill Webb noted that NICET exempts engineers from certification and noted that ASHRAE may wish to consider a similar exemption.

f) TC9.1 (Large Building Air Conditioning Systems) – David Elovitz

Nothing to report.

g) TC9.8 (Large Building Air Conditioning Applications) – Ted Ritter

Nothing to report.

h) TC9.10 (Laboratory Systems) – Ron Petersen

Nothing to report.

i) TC9.12 (Tall Buildings) – Bill Webb

Bill Webb noted that tall buildings are defined as those over 300 feet in height. Committee is pursuing research topics.

7) Inter-Society Liaison Reports:

- a) CIBSE (Chartered Institute of Building Services Engineers) – (liaison needed)

Nothing to report.

- b) NFPA 80 (Standard for Fire Doors and Fire Windows) – Bob VanBecelaere

NFPA 90A will reference NFPA 80 (Fire Dampers) and 105 (Smoke Dampers). These new standards require dampers to be checked after one year, then checked on a four year cycle.

- c) NFPA 90A (Air Conditioning and Ventilating Systems) – Bob Wasilewski

Meeting scheduled in two weeks.

- d) NFPA 92A and NFPA 92B (Smoke Management) – John Klote

The NFPA Smoke management committee will be meeting in Las Vegas on 8 – 9 February to review public comments and develop committee comments. Two task groups have been meeting to develop committee proposals. Overall, the comments appear to be minor.

The ASHRAE funded balcony spill plume work developed by NRC Canada was discussed. Gary Lougheed was the principal investigator for this work and is also a member of the committee and is chairing the task group to review NFPA 92B. Gary noted that proposals will be submitted to the NFPA smoke management committee for consideration.

- e) UL – Tim Orris

Tim noted that the AMCA Damper Engineering Committee is currently developing proposals to present to the UL 555S STP. The proposals address multiple section damper assemblies, as alternate operation test method for torque compensation and leakage rated damper testing options. These documents will be reviewed for final approval at the AMCA 2007 Spring Meetings in March before being submitted to UL.

The following AMCA publications have completed their fire year revisions cycles: *511 Certified Ratings Program for Air Control Devices*; *500-D Laboratory Methods of Testing Dampers*; and *502 Damper Application Manual*.

AMCA members will meet with UL staff in March to discuss damper testing issues.

- f) AMCA – Tim Orris

(see item e)

- g) SFPE – Jeff Tubbs

Jeff noted that the SFPE has a Task group on design fires, and a Task group on use of computer models. The SFPE Handbook is currently being revised. See the SFPE Web site for more information (www.sfpe.org).

8) Old Business

No old business.

9) New Business

Technology Council Request for New Smoke Management Standard

ASHRAE member council referred the following motion “that ASHRAE develop an ASHRAE standard on smoke management HVAC&R and control systems” to the technology council. TC 5.6 was instructed to consider this motion and provide recommendation back to the Technology Council. The substantiation for this noted the following “ASHRAE has a TC 5.6 and a handbook chapter 52 in Applications. We need an ASHRAE standard.”

The committee discussed this request. All agreed that NFPA currently has standards for smoke management design. Many of the ASHRAE TC5.6 members are also members of NFPA90A, 90B, 92A, and 92B. ASHRAE has a text on the design of smoke management systems and is working on updating the smoke management commissioning guidelines. Many of the members of TC5.6 already participate in the development of the NFPA standards, and developing an ASHRAE standard would duplicate these efforts using the same people.

TC5.6 voted to recommend against the motion to develop an ASHRAE standard on Smoke Management HVAC&R and Control Systems (For: 12, Against: 0, Abstentions: 0).

The committee requested that the submitter identifies areas in the NFPA documents needing review and further consideration.

Professional Development Committee

David Meredith from the Professional Development Committee noted that ASHRAE currently offers the following courses: (1) PDF 15 – Design of Smoke Management, and (2) CS 3 – CFD for ASHRAE Applications: Basics Issues and Guidelines. Dave noted that while these courses have been offered for a number of years, there have been no requests for these courses in this time.

The committee voted and agreed with removing these courses (For: 12, Against: 0, Abstentions: 0).

10) Adjournment

The meeting was adjourned at 6:00 pm.