

# ASHRAE

**TC/TG/TRG NO: TC 9.9 Date: Jan. 21 & 22, 2018 Location: Chicago, IL USA**  
**General Meeting/ Subcommittee and Liaison Report**

## **TC/TG/TRG TITLE: Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment**

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<b>VOTING MEMBERS</b>	<b>Employer</b>	<b>Appoint. Year</b>	<b>End Year</b>	<b>Position</b>	<b>Attendance</b>
Andrew R Baxter	Page Southerland Page	2014	2018	Member	Sunday & Monday
Thomas A Davidson	DLB Associates Consulting	2014	2018	Member	Sunday & Monday
Dr. Dustin Demetriou	IBM	2017	2019	Vice Chair	Sunday & Monday
Paul R. Finch	Kao Data	2014	2018	Member	Sunday & Monday
Jon Fitch	Dell	2015	2019	Member	Sunday & Monday
Jack V. Glass	Citigroup – Technology Infrastructure (Retired)	2014	2018	Member & Subcommittee Chair	Sunday & Monday
John C Groenewold	JPMorgan Chase	2014	2018	Secretary	Sunday & Monday
David F Kelley	Retired consultant for VERTIV-Liebert	2014	2018	Member	Sunday & Monday
Dr. Mukesh K Khattar, PhD.	EPRI	2015	2019	Member	Sunday & Monday
Jason Matteson	Vertiv	2017	2019	Chair	Sunday & Monday
Richard Pavlak	Heapy Engineering	2014	2018	Member & Subcommittee Chair	Sunday & Monday
Jeffrey P Rutt	Department of Defense	2014	2018	Member	Not Present
Edward Ka Cheung Tsui	Intelligent Technologies, Ltd	2014	2018	Member	Monday
Christopher Muller	Purafil	2016	2020	Member	Sunday & Monday

<b>Committee Positions</b>	
<b>Name</b>	<b>Position</b>
Jason Matteson	Chair
Dr. Dustin Demetriou	Vice-Chair
Roger Schmidt	IT Subcommittee Chair
Don Beaty	Publications & International Liaison
Nick Gangemi	Programs Subcommittee Chair
Robert McFarlane	Handbook Subcommittee Chair
Richard Pavlak	Standards Subcommittee Chair
David Quirk	Research Subcommittee Chair & 90.4 Liaison
Jack Glass	Membership Subcommittee Chair

Ecton English	Webmaster
John Groenewold	Secretary

Sunday, January 21st

**5:00 p.m.**

The following items were covered:

### General Items

- Jason Matteson is new chair effective July 1, 2017.
- Dustin Demetriou is new vice-chair effective July 1, 2017.
- Distributed Roster
- Jason sent out an email blast at the beginning of December and solicited feedback as to whether it was received.
- Recommended using the ASHRAE app for conferences.
- ASHRAE wants those here only for TC attendance to get a “TC-only” badge from registration.

### Programs – Nick Gangemi

- Nick distributed a handout with information about the future meetings as well as information on the types of sessions that are presented at these conferences.
- 90% acceptance on conference and technical papers
- 50% for seminars
- Research and case studies are very highly accepted.
- ASHRAE.org/[name of the city for information on upcoming conferences.
- 2 of 5 seminars were accepted Houston.
- 1 conference paper was accepted for Houston.

### Handbook – Bob McFarlane

- Online version updates of the handbook are out of the normal sequence for handbook updates on the four year cycle.
- New Handbook liaison had communication issues that almost derailed the latest online updates. Another new liaison will be assigned.
- Result the updates that the team worked on will be published despite missing the deadline. An exemption was granted due to the communication issues.
- Handbook committee needs to work on more off-cycle/online updates
- Off-cycle/Online updates will automatically be rolled into the next cycle.

- Bob is currently the only member of the Handbook committee and he needs volunteers.
- Handbook committee needs to start working on the next published handbook update.
- There is a new online tool for collaboration but it is only compatible with Microsoft Internet Explorer. This may be an issue for Mac users.
- Chapter 19 of the Applications Handbook is the Data Centers and Telecommunications Facilities chapter that TC9.9 is responsible.
- Latest version of the Handbook is 2015.
- All forthcoming submissions to for online handbook updates will be simultaneously submitted to both the Handbook Committee and the Liaison.
- It could be two months before online version changes are available.

### Research – David Quirk

- 1675-TRP (Mark Seymour reported)– Guidance for CFD Modeling of Data Centers Co-sponsored supporting TC 4.10)
  - i. Florida International University is performing the work.
  - ii. FIU’s lab space cannot be created in the available area.
  - iii. FIU funding has stopped.
  - iv. TC4.10 to approve the subcontract to Georgia Tech.
  - v. Meeting with FIU to review the workplan.
  - vi. Hope to complete in 12 months once this is approved.
- 1755-TRP (Dustin Demetriou reported) – Impact of High Humidity and Gaseous Contamination on the Reliable Operation of Information Technology Equipment in Data Centers
  - i. Completion date June 30, 2018.
  - ii. Started in July/2016 at Syracuse University.
  - iii. Recommendations based on different pollution levels is a possibility.
  - iv. PMS meeting tomorrow.
  - v. Main work items remaining are how to do the testing now that the facility has been completed.
  - vi. Scope will include new recommendations for the thermal guidelines environmental envelope for heavily contaminated areas.
  - vii. Tests completed on 5 basic contaminants and impact on copper and silver.
  - viii. Corrosion rates were high compared to 200-300 A. Chlorine was suspected to be the main contributor.
  - ix. New tests were devised to see which of the 5 contaminants is the real contributor.
  - x. Reports on the new tests are expected soon.
  - xi. PI is looking at surface analysis using SEM analysis. Impact of roughness on corrosion rates.

- xii. Not in scope but learned from PI, how do you model corrosion to relate to field conditions. They have some proposals that will be reviewed at meeting tomorrow.
- xiii. Purafil is providing the analysis in addition to the in-house analysis.
- xiv. Scope is also looking at the impact of voltage bias. It is suspected that is a major contributor to corrosion rates.
- xv. Tests now include setups with voltage bias.
- xvi. Progress has been deemed to be good even as the scope has been increased with additional tests.
- xvii. Looking at different ASHRAE ranges such as A2 to determine how the results can be applied in the field.
- xviii. More results are expected for the Houston conference.
- 1739-WS – DC Energy Modeling (Vali Sorell reported)
  - i. Vali Sorell is taking over the leading the effort from Henry Amistadi.
  - ii. Working on simplified data center energy calculations.
  - iii. ASHRAE Std. 90.4 has been created and adopted.
  - iv. 90.4 calculations have a couple of single point calculations.
  - v. Simplified modeling is looking to replace/push 90.4 in a more sophisticated direction for energy calculations.
  - vi. Henry was unable to attend the meetings at this conference.
  - vii. May not create the simplified calculation but might write a white paper on how to do it.
  - viii. Opportunity to create the code over the next couple of years to create those tools in the marketplace using the whitepaper as guidance.
  - ix. Working group will make efforts to try and change the course in 90.4 committee for better calculations.
  - x. Working group has reviewed the existing automated tools. The existing set of available software is not well suited for data center environments because it is so different from commercial building operations and infrastructure.

**Monday, January 22nd**

## **Opening and Introductions – Jason Matteson**

- Introductions of all present at the meeting.
- Agenda was reviewed.
- Voting members and officers discussion
- Jason issued a call for help in marketing the Datacom books.
- 14 current voting members and effective July 1, 2018 there will be only 13.
- Voting members appointed by chair for no more than 4 consecutive terms. Only one person from a single organization.
- 6 new voting members will be among the 12 voting members.
- There can be a maximum of 18 voting members.
- Discussed the differences between Provisional Corresponding Member. PCM until the chair makes you a Corresponding member. Update occurs every Winter conference on the Tuesday following the main meeting.
- The membership management system is now all online.
- Roster update is effective on July 1, 2018.
- If you were a PCM will automatically be moved to CM effective July 1, 2018.
- PCMs cannot be voting members.
- CMs number 325.
- Question was asked that since we are the largest TC in ASHRAE why we would not have the maximum number of voting members (18). The response was that 12 was deemed to be appropriate at this time. Also, it was noted that an increase in the number of voting members means a larger number required for a quorum.
- Bob McFarlane commented on the potential ways that a CM can contribute to the TC.

## **Website – Jason Matteson & Dustin Demetriou**

- ASHRAE's website has a link to all TC websites including TC 9.9.
- Presentation on ASHRAE and TC 9.9 is under Presentations.
- <http://tc0909.ashraetcs.org/index.php>
- Current Roster is available on website.
- Under "Membership" tab there is a button "Join TC 9.9" to request TC 9.9 provisional corresponding membership. Membership is free.
- Ecton English will continue to update website.
- Long Beach meeting minutes are posted.
- Chicago agenda posted on the website.

## **Programs – Nick Gangemi**

- Nick can be contacted at 585-509-5746 or [n.gangemi@northernairtech.com](mailto:n.gangemi@northernairtech.com)

- Nick went over guidelines for submission of sessions, technical papers, conference papers.
- Houston, TX is the next summer conference.
- See <http://www.ashrae.org/Houston> for deadline dates for submissions.
- Two handouts - General information about programs and upcoming conferences. Also information about current summary and TC 9.9 seminars and programs.
- Houston Program (Seminar, Forum, Workshop, Debate and Panel) Proposals due Feb. 9, 2018
- Houston Revised Conference Papers/Final Technical Papers due Feb. 9, 2018.
- Houston Tracks and descriptions were also discussed.
- Conference Paper abstract deadline is March 5, 2018.
- Transaction (entire document) deadline is March 5, 2018
- Consultant or End User needs not being met should come to Nick for presentation to meet the need.

## Liaison Reports

- 90.1 update – Richard Pavlak
  - 2016 version is available in the bookstore.
  - Long Beach a risk analysis was done to data center industry. It will be posted on the website.
  - 90.1 portal created by ASHRAE, 2013 and 2016 versions along with the user manual are available with free access between now and March 15, 2018 if you are an ASHRAE member. The changes and revisions from the 2013 to 2016 version are highlighted.
  - 2016 version has not yet been picked up by any jurisdiction but it is expected that some early adopter states like New Jersey are expected to soon.
  - Most of the US is on the 2010 version
  - 2010 is where computer rooms entered the code. Before that they were exempted.
- 90.4 update – Dave Kelley
  - The standard was published in 2016
  - Was not adopted by ICC later that year.
  - Not up again until 2019.
  - Not adopted by any states at this point.
  - Now a sustaining committee like 90.1
  - Biggest issue is that people don't know what the code is.
  - Goal in Long Beach was to market the code document.
  - A presentation on 90.4 was created to help in the ICC lobbying presentation.
  - Trying to promote at other organizational meetings like 7x24 Exchange
  - The 90.4 presentation was played.
  - The presentation is a first for ASHRAE as a promotional tool.
  - Email feedback to Dave Kelley.
  - Goal is to get it posted or a link on the ICC website so their membership can view.
  - McFarlane is the voiceover on the presentation.
  - Push to be presented at annual ICC meeting in the fall.

- Potential for 3-4 recorded versions of various lengths.
- 90.4 was considered for ICC 2018 code but voting members rejected as they generally do for late submittals.
- The presentation shown was not the final version. Final version will be posted to the TC 9.9 website but is not available yet.
- SPC127 – John Bean
  - Method of test for rating CRAH & CRAC
  - Current is 2012.
  - Current formed back in 2014 with a mission to revise 2012 version.
  - Old version was narrowly scoped on unitary air conditioning (chilled water) for data centers.
  - New version will now address some newer technologies such as adiabatic systems, etc.
  - Title, Purpose and Scope was revised.
  - Focused on method of testing for rating of air conditioning units serving data centers and other information technology spaces.
  - Align with language in 90.4.
  - Scope limited to equipment that changed the enthalpy of the air.
  - Direct fresh air systems were excluded.
  - Chillers are exempt as well.
  - No rating of the subsystems such as the outdoor pieces (condensers, etc.)
  - No VRF in scope.
  - Only three comments at Long Beach on scope. Comments skyrocketed to 38 in the time right before closing from a small group of people. All 38 comments have been reviewed and responded to.
  - Revisions to respond to comments are underway and some will require extensive changes. The entire standard will most likely have to be opened again for full review but hoping to avoid.
  - Huge amount of effort especially compared with past efforts and has a lot more interest from the public.
- AHRI 1360 update - David Kelley
  - Datacom product group consists of 4 manufacturers.
  - New version now includes the ceiling mounted projects in addition to floor mounted.
  - New version published in the end of 2017.
  - Anticipating the DOE regulations for new version of 90.1.
  - DOE has 18 months from issue of 90.1 to update the tables. They are way behind at this moment.
  - DOE had 20 questions about equipment that were mostly answered by the Datacom manufacturers group.
  - DOE is leaning towards if marketed as data center equipment then it should be regulated as data center equipment. Right now the direction is unknown.
  - If regulated as data center equipment then equipment would have to be rated at data center conditions and not just comfort conditions.



- Green Grid – Mark Seymour
  - TOC for liquid cooling has been published by GG.
  - White paper for DCIM is now being worked on by GG.
  - GG has a different viewpoint focused on automation.
  - Mark thinks that we should be coordinating more closely with GG.
  - Published a open standard on data center reliability.
  - Working on a standardized method for information communication with data center equipment.
  - Mark reviewed the list of publications available from GG.
- DMTF Redfish – Jason Matteson
  - Chris Lindberg and Jason Matteson are liaisons to DMTF
  - DMTF = Distributed Management Task Force.
  - [www.dmtf.org](http://www.dmtf.org)
  - Working on development of API.
  - Promote the use of a common language for communication.
  - Meet customer demands for simple and secure management in modern Software Defined Data Center (SDDC) environments.
  - SPMF = Scalable Platforms Management Forum.
  - IT equipment need to submit the IT cooling sensors to work in conjunction with proposals from GG.
  - GG submitted schema and manufacturers schemas included in task force work.
  - 0.2 version out end of last year.
  - 0.3 version out in March.
  - Intent is to get information from IT equipment for use in Building Management Systems such as inlet temperatures, power draw, cooling power draw, etc.
- International – Don Beaty
  - ASHRAE is really interested in international.
  - Paul Finch has been working with EU.

## Vice Chair of TC 7.9 - Justin Cedar

- New commissioning standard 1.6 specifically for data centers
  - First meeting of new governing committee is going to be at the Houston conference in the Summer.
  - Interested parties should plan on attending in Houston.
  - Justin Cedar's contact information will be posted on TC 9.9 website.
  - Members are encouraged to contact Justin for more information.

## Research – David Quirk

- Same information as presented on Sunday night.
- High humidity Project & CFD validation project.
- CFD Project

- CFD using Georgia Tech lab as solution.
- 1 year behind schedule but proceeding forward
- Humidity project is on schedule.

## Industry Engagements – Dustin Demetriou

- Data Center Ireland Conference where Robin Steinbrecher presented.
  - TC9.9 was asked to participate in new ASHRAE chapter.
  - They had specific interest in TC 9.9.
  - Focused on formal presentation on TC 9.9 Information, Datacom books, and 90.1/90.4.
  - Robin also participated in a panel discussion about the impact of European standards.
  - We need to do better in welcoming international participation.
- SemiTherm
  - Electronics packaging committee
  - Wanted TC9.9 to come talk about the Datacom books and other material.
  - Plan to have a booth at the SemiTherm conference to sell Datacom books or samples.
  - Next conference is March 2018 in San Jose.

## DOE – Steve Greenberg

### Energy Efficiency Initiatives

- <http://datacenters.lbl.gov> is sponsored by government and contains a lot of good information.
- Presented latest on energy savings initiatives from LBNL/DOE.
- Emphasis on small data centers. Feel they are under-represented.
- Small data centers host approximately half of the world's servers.
- Webinars held on improving energy efficiency at the small, older data centers.
- Developing an air management webinar.
- Have a webinar on environmental conditions reviewing Datacom book one.
- Helping out federal agencies that are mandated on improving their PUEs.
- Data Center Energy Practitioner Program for certification (2 levels, Basic and HVAC specialist). IT specialist certification being developed.
- Liquid cooled rack specifications are being developed.
- Tools being worked on energy assessment worksheet
- Air management work guide tool is also available.
- Contact Steve or visit website for more information
- Small data center is defined as less than 5000 square feet.
- Federal facilities are required to get below 1.5 by the end of the year.

## Data Center Infrastructure – Jim VanGilder

- Temperature Rise Simulation due to Power Failure
- Spreadsheet tool to estimate the temperature rise rate due to power failure was presented.
- Switching back to line power should potentially be delayed until temperatures have recovered.
- Discussion around VFD equipped chiller restart times and strategies.

## Publications

- Datacom Book #2: IT Equipment Power Trends Book Update – Dustin Demetriou & Susan Smith
  - 2<sup>nd</sup> edition
  - Credit to Susan Smith for driving the development of the book.
  - On sale now in the bookstore.
  - Change in the title.
  - Updated trend chart based on the type of workload the server is handling and its configuration.
  - Went from W/sf to power per 42U rack metric.
  - Addressed the growth rate of power consumption.
  - Book attempts to better align the facilities people and the people buying the IT equipment.
  - 8 different types of workloads are examined.
  - Airflow trends are addressed with their impact on facilities planning.
- Datacom Book #3: Design Considerations for Datacom Equipment Centers – Larry Ollice
  - Been working on it for a year.
  - Chapters were reviewed at today's meeting.
  - Peer reviews are in progress.
  - After review today they realized that they were not quite ready.
  - Put together teams of SME to work together to finish each chapter.
  - Book was last done in 2012.
  - Some chapter names are changing from last version.
- Datacom Book #14: DCIM – Chris Lindberg
  - Full external review of the book by the end of February.
  - Chris is the official liaison to DMTF.
  - Book goal, outline and TOC were presented.
  - ALC and Johnson Controls have joined the effort.
  - Working very closely with DMTF on Redfish.
- Publication Update – Don Beaty
  - Don Beaty asked the group about any suggestions for new marketing ideas for the Datacom series of books.

## ITE Subcommittee Report – Roger Schmidt

- Liquid Cooling – Roger Schmidt
  - Whitepaper
  - Working on title.
  - June schedule for first draft to be done.
- Hard Disk Drives Whitepaper – Matt Shumway
  - Leading working group.
  - World still depends on inexpensive disk storage.
  - HDDs are becoming more sensitive to vibrations
  - Acoustic vibrations coming from the cooling fans are becoming a bigger issue.
  - Working to put together a whitepaper to outline the challenges and potential solutions.
- Cold Weather Shipping Requirements – Joe Prisco
  - Needs help to make the whitepaper a reality.
  - Committee on Cold Weather Design Guide might be a good resource.
  - TRG 9 Cold Climate Design
- Liquid Cooling in Colos – Dave Moss
  - Potential whitepaper
  - Looking for assistance with potential whitepaper
  - We are seeing the need to address the challenges to help remove barriers and improve acceptance by owners and occupants.

## Executive Session

- Not held as it was determined there was no need at the time of the meeting.

## Wrap up

- Need marketing subcommittee chair volunteer
- 103 people in attendance for Monday meeting.
- Need handbook subcommittee volunteers

# ASHRAE TC 9.9

## Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

First Name	Last Name	Position	Sunday Attendance	Monday Attendance
Ahmed	Abdel Salam	Provisional Corresponding Member	X	X
Gerardo	Alfonso	Corresponding Member	X	X
Mukul	Anand	Provisional Corresponding Member	X	X
Andrew	Baxter	Member	X	X
John	Bean	Corresponding Member	X	X
Donald	Beaty	Corresponding Member	X	X
Holly	Brink	Provisional Corresponding Member	X	X
Lance	Brown	Provisional Corresponding Member		X
Matthew	Brown	Provisional Corresponding Member		X
Chris	Campbell	Provisional Corresponding Member		X
Brad	Cochran	Provisional Corresponding Member		X
Michael	Collarin	Corresponding Member	X	X
Bryce	Cox	Provisional Corresponding Member		X
Shelley	Dangoor	Provisional Corresponding Member		X
Thomas	Davidson	Member	X	X
Dustin	Demetriou	Vice Chair	X	X
Benedict	Dolcich	Provisional Corresponding Member		X
John	Dumler	Corresponding Member		X
Dan	Dyer	Corresponding Member		X
Michael	Ellsworth	Corresponding Member	X	X
Jeffrey	Ewin	Corresponding Member		X
Paul	Finch	Member	X	X
Mark	Fisher	Provisional Corresponding Member		X
Jon	Fitch	Member	X	X
Clayton	Foster	Provisional Corresponding Member		X
Charles	Freda	Provisional Corresponding Member		X
Joseph	Gangemi	Program Subcommittee Chair	X	X
Arthur	Giesler	Corresponding Member		X
Jack	Glass	Membership Subcommittee Chair	X	X
Troy	Goldschmidt	Provisional Corresponding Member		X
David	Grant	Corresponding Member	X	X
Steve	Greenberg	Corresponding Member	X	X
John	Groenewold	Secretary	X	X
John	Gross	Provisional Corresponding Member	X	X
Edward	Gutowski	Corresponding Member		X
Hugh	Hudson	Corresponding Member		X
Kevin	Hughes	Corresponding Member		X
Steven	Hyde	Provisional Corresponding Member	X	X
Mahmoud	Ibrahim	Provisional Corresponding Member		X
Gwenn	Ivester	Provisional Corresponding Member	X	X

# ASHRAE TC 9.9

## Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

Gary	Johnson, Jr	Provisional Corresponding Member		X
David	Kelley	Member	X	X
Mukesh	Khattar	Member	X	X
Matt	Koukl	Corresponding Member	X	X
Christopher	Kurkjian	Corresponding Member		X
Elizabeth	Langer	Provisional Corresponding Member	X	X
Stuart	Lawrence	Corresponding Member		X
Allan	Lee	Provisional Corresponding Member		X
Sang	Lee	Corresponding Member		X
Mark	Malkin	Provisional Corresponding Member		X
Jason	Matteson	Chair	X	X
Robert	McFarlane	Handbook Subcommittee Chair	X	X
David	Meadows	Corresponding Member		X
David	Moss	Corresponding Member	X	X
Stephen	Mowrer	Corresponding Member		X
Christopher	Muller	Member	X	X
Kourosch	Nemati	Provisional Corresponding Member	X	X
Shlomo	Novotny	Corresponding Member	X	X
Lawrence	Ollice	Provisional Corresponding Member	X	X
Christian	Pastrana	Provisional Corresponding Member		X
Richard	Pavlak	Standards Subcommittee Chair	X	X
Mark	Pavol	Corresponding Member		X
John	Peterson	Corresponding Member	X	X
Joseph	Prisco	Corresponding Member		X
Justin	Prosser	Provisional Corresponding Member	X	X
David	Quirk	Research Subcommittee Chair	X	X
Terry	Rodgers	Corresponding Member	X	X
Joel	Rutledge	Corresponding Member		X
Hitoshi	Sakamoto	Provisional Corresponding Member		X
Roger	Schmidt	Corresponding Member	X	X
Justin	Seter	Corresponding Member	X	X
Mark	Seymour	Corresponding Member	X	X
Timothy	Shedd	Corresponding Member	X	X
Matt	Shumway	Provisional Corresponding Member	X	X
Vali	Sorell	Corresponding Member	X	X
Marc	Sorge	Provisional Corresponding Member	X	X
Mark	Steinke	Provisional Corresponding Member		X
Russell	Tipton	Provisional Corresponding Member	X	
Edward	Tsui	Member		X
Marianna	Vallejo	Corresponding Member		X
Casey	Winkel	Provisional Corresponding Member	X	X
Mikheil	Gorbounov	Guest	X	X

## ASHRAE TC 9.9

### Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

John	O'Brien	Guest	X	X
Tianyi	Gao	Guest	X	X
Marcus	Hassen	Guest	X	X
Ben	Coe	Guest	X	X
Shawn	Andrews	Guest	X	X
Aaron	Wemhoff	Guest	X	X
Sophia	Flucker	Guest	X	X
Satyam	Bendapudi	Guest		X
Yang	Zou	Guest		X
Nathan	Fetting	Guest		X
Camelia	Mititew	Guest		X
Andrew	Calder	Guest		X
Thomas	Peddle	Guest		X
Marcus	Moliteus	Guest		X
Douglas	Brown	Guest		X
Mitch	Pinsker	Guest		X
Paul	Bemis	Guest		X
Bartlomiej	Tokarzewski	Guest		X
Annie	Smith	Guest		X
Paul	Pelczynski	Guest		X
Evan	Reese	Guest		X
Junta	Matsuo	Guest		X
Rajendera	Kapor	Guest		X
Jim	Bogart	Guest		X
Jim	VanGilder	Guest		X
Ryan	Kerfien	Guest		X
Jason	Long	Guest		X
Thomas	Woodriff	Guest		X