

Draft Minutes
TC 2.3 - Gaseous Contaminants/Removal Equipment
Research Subcommittee Meeting
Orlando, Sunday 5:00-7:00 pm

1. Meeting call to order (@5:06PM)
2. Introductions and Sign-In
3. Review of Minutes from KC
4. Change in Leadership
 - A. Kathleen will be stepping down as Chair. Paula is stepping in as the new Chair. Caitlin Naske will take over as the VC/Sec.
5. RAC Report (Liaison TC 2.3 – Bill Hutzel)
 - A. Replaced Pawel. TC 2.3 is the most active of Section 2 from his perspective.
 - B. RAC meeting update: Only 2 new RTARs, no new WS. Room for more research ideas.
 - C. New acronym. PTAR – Partnership between RAC and Publications. If there's a possibility to sell and make money, new route for funding through ASHRAE.
 - D. URP – Unsolicited Research Proposal. More rigorous path. ASHRAE would rather have ideas generated internally. If the idea could have originated here in TC 2.3, the URP probably won't go anywhere in ASHRAE.
 - E. Funding? Generally successful. No exact numbers.
6. Active Projects – 40 min
 - A. URP Presentation – Ionization AHU (Schiphol Airport). Hans Besselink.
 1. Presented in Long Beach (2017 ASHRAE Summer).
 2. Started with idea of 4-weeks of measurement at airport. Expanded to 1-year. Airport covers 50% of funding. Also funding from Dutch.
 3. Measure performance of carbon filtering next to ionization.
 4. Ionization technologies (89 AHU) already implemented at other airports (Zurich).
 5. Kathleen – RAC will probably send this project to TC 2.3 for voting for co-funding/co-sponsorship.
 6. Brian – Can we get a PMS setup for this?
 7. Kathleen – RAC must assign it to TC2.3 first. If TC 2.3 decides to be sponsoring TC, then we would setup a PMS.
 - B. **1720-RP Validation of gas-phase air-cleaner performance test method (Standard 145.2) by laboratory testing of commercially available filtration devices** – PMS: Gemma Kerr, Paula Levasseur, Chris Muller, Nick Agopian, Marilyn Listvan. PI: Kathleen Owen
 1. Interlaboratory Study (ILS) of 145.2.
 2. ILS objectives: Are tests repeatable within a lab for identical filters with the same gas? Do different labs get the same results? Does the challenge gas matter?
 3. No test data yet.
 4. Relative rarity of 145.2 testing labs. 7 possible labs. QA and Equipment Information Questionnaire required from labs.
 5. Ozone and toluene are the challenge gases.
 6. Tests done in triplicate.
 7. Paula – Questioned choice of blended carbon / permanganate-impregnated alumina filters for ozone testing.

8. Kathleen – Did not want filters that performed too well or too poorly.
9. Scheduled to end in August 2020.
 - c. 1 testing ozone now
 - d. 1 almost done with QA
 - e. 3 labs with equipment in, QA in progress (1 ozone only)
 - f. 1 started
 - g. 1 interested, but no paperwork yet.
10. Goal before Austin: More labs ready to test. Filters shipped out. Start test data analysis.
11. Dan – Will other half of filters be from the same batch?
12. Paula – Check on QC data on the carbon.
13. Kathleen – Will ask manufacturer for this carbon QC data.

C. 1579-RP Testing and Evaluation of Ozone Filters for Improving IAQ— PMS: Sanjeev Hingorani, Kevin Kwong, Matt Middlebrooks, Nick Agopian, Thad Ptak, Hans Bessellink (EHC). PI - Atila Novoselac; Jeff Siegel, Consultant. **(Hoy Banohan is new guy)**

1. Note after KC meeting – Hans Bessellink *is our EHC rep. We are trying to reach him or get another EHC rep.*
2. PMS meeting on Tuesday, 8-9am. Room Clear Lake at Hilton.
3. Literature review and market study – done.
4. Development of test protocol – done
5. Performance testing – 60% done
6. Data analysis – 50% done
7. 1-year into project. 18-month anticipated project duration.
 - c. Will file a no-cost extension to correct endpoint (should end in February 2020) to give them the planned 18 months. Vote in TC 2.3. Send to RAC.
8. Test protocol: 4-hours 70 ppb, 4 hours 107 ppb, 12 hours 500 ppb. At nominal conditions.
9. Finished testing on 11 filters at nominal conditions.
10. Extra work outside of the scope of this project: Using ultrafine particle counters (0.02-1um). SEM of carbon granules. Real-time by-product measurement using PTR-MS.

D. 1780-RP, Test Method to Evaluate Cross-contamination of Gaseous Contaminant within Total Energy Recovery Devices; Responsible Committee: TC 9.10 (Laboratory Systems); Co-Sponsors: TC 2.3. Nick Agopian on PES/PMS.

1. Jensen update: PES is evaluating bids

E. 1838-RP Inclusion of Electronic Air Cleaners PMS: Kevin Kwong. PMS: Jeff Roseberry, Tony Abate, Nick Agopian, Ashish Mathur, Paula Levasseur. PI: Dean Tompkins; co-PI Kathleen Owen. Start Date: Nov 2019.

1. Main objective: How would these EAC technologies be added to the 145.2 test method?
2. Dean provided an update on the lit search and keywords
3. Antonios provided an update on ROS background information. Which by-products do we need to measure for?
4. Kathleen provided an update on the survey of labs and manufacturers.
 - c. Brian will provide Kathleen with a Honeywell contact.
 - d. 6 labs and 2 manufacturers surveyed.
 - e. Not a lot of testing at commercial labs. A fair amount of testing on the small scale in academia.
 - f. Chamber tests most common in labs.
 - g. Dean – Do manufacturer names need to be redacted?

7. Work statements and RTARs – Updates – 30 min

- A. **1867-RTAR: Development and validation of a model for assessing the corrosion risk of Datacom equipment under different pollution and thermal environmental conditions.** TC 9.9 sponsor. 2.3 co-sponsored. TC 2.3 needs a person on the WS writing group. RTAR was rejected by RAC after 8/15/18. RAC couldn't see any difference between this and existing project (1755). Existing project must be completed first.
1. Jensen – Attended TC 9.9. Some comments need to be addressed before resubmitting.
 2. 2 questions: 1) 1755 is done. Paper was accepted for publication. 2) New project is now very different from the old version.
- B. **1869-RTAR:** Evaluation of Indoor Air Contaminants with respect to Development of a Revised Indoor Air Quality Procedure (IAQP) Design Compound and Design Target Lists for Standard 62.1. Champion: Gemma Kerr. WG: James Dennison, Dean Tompkins, Marwa Zaatari, Hoy Bohanon, Wayne Thomann. Submitted 8/15/18, 11/8 accepted with comment to go on to WS.
1. Gemma – Accepted by RAC with comments. Does not have technical background to do the main writing. Passed writing work to Jim Dennison.
- C. **1846-RTAR:** Real Time Small sensors: Brian K., Fuoad Parvin, Thad Ptak, Jeff Roseberry, Sanjeev H., Jensen Zhang, Jordan Clark. No Update – waiting on the 2.4 sensor study
1. Brian – Will check on 2.4 sensor study.
- D. **1858-RTAR:** sVOCs including how SVOC emissions change with temperature - Sanjeev*, Jianshun Zhang, Kevin Kwong, Ying Xu New version was accepted with comments to be written as a WS on 11/5/19. Ying Xu wrote a draft WS in December.
1. Added Brent Stephens, Brandon Boor, and Jim Rosenthal.
 2. Plan for liaison review, TC 2.3 / TC 2.4 votes, and submission before March 15 deadline.
 3. Potential bidders? Atila (UT-Austin), Dean Tompkins ACL.

8. Proposed RTARS and other work: status updates - 30 min

- A. Bipolar Ionization/Reactive Air Cleaner performance chamber test method for VOC etc. removal and testing a variety of commercially available ionization devices. Tony Abate champion, Scott Sherwood, Jensen, Dean Tompkins, Charlie Waddell, Chang-Seo, Marilyn Listvan, Ashish. Hold until we hear results of ISO/IEC.
1. No work done. Topic is still of interest.
- B. The effects of filtration on health. Dean Tompkins, Nick Agopian, Lexuan Zhong with EHC interest. Keep on the list Nick Agopian.
1. Topic is still of interest.
- C. Acceptable VOC types and concentrations for inclusion in multi contaminant test gases - on hold. Ashish to champion, Kathleen, Gemma, and Paula.
- I. Ashish, Jensen, and Gemma wanted this idea left on the list – status is the same.
 1. Interest remains.
- D. Demand-based air-cleaner operation to save energy. Brian Krafthefer, Jensen Zhang, Kyle Kisebach, someone from GPC 35 – Brian will work on this after the Sensor project (if).
1. Drop this from list

- E. Venting for 3D Printers: needs champion (Paula, Gemma, Marwa, Dan, Joel Foster (2?.9), Wayne Tomman (EHC) with Brent talking to 2.4). needs champion. Wayne gave KO two potential helpers. Matthew Stiegel, Ph.D. and Courtney Stanion
1. Still needs a champion. Dan Mason met with Brent and other EHC people. Dan may step up as champion at a later date.
 2. Gemma – Talk to TC 5.8 (ventilation)? Topic is of growing interest.
 3. Marilyn will join on for this topic.
- F. Effect of particles on loading on gas filters, with possible interest in looking at other combinations of technologies in the same air cleaner (probably a separate project) 2.4 / 2.3/ 2.9 (Matt, Brian, Paula, VJ). Draft in progress: Still waiting for votes from TC2.3, 2.4, and GPC 35
1. Waiting on TC 2.4 and GPC 35 co-sponsorship votes.
 2. Got GPC vote on Monday. Voted to cosponsor.
- G. New ideas: Jeff Siegal – interested in testing an air cleaner – using a chamber test. Gemma, Matt, Christine and Kathleen, Sanjeev, Paula.
1. Gemma – Is this a decay chamber test? If so, IEC is far ahead in developing and we should drop this topic.
 2. Sanjeev – This is a combination duct and chamber.

9. Gas-phase dinner plans – none for this meeting

10. Adjourn Meeting (@ 6:49pm)

Notes from research chair breakfast (Monday morning):

- **Survey for Research Strategic Plan**
 - **Please fill out the survey!!!**
 - Email sent in January. Will be resent soon. You need to access through this email
- Currently: 49 Research Projects on-going
 - At the Fall meeting – 8 added, 1 rejected
 - Expect 10 active projects to complete this year
- Orlando - on Saturday
 - 2 Research Topic Acceptance Requests (RTAR) reviewed on Saturday
 - Contractor Selections for 11 Projects (30 bids) will be reviewed on Wednesday
 - 2 Unsolicited Research Proposals
- RAC Awards – please submit applications
 - New Investigator Award
 - ≤ \$125K over 3 yr to support research
 - Highly competitive award
 - 11 applications reviewed on Saturday
 - 1 selected
 - Homer Addams Award
 - Recognizes graduate students for outstanding STBE papers
 - \$5K
 - 2 nomination packages received, 1 selected
 - Service to ASHRAE Research
 - no applications this year!
 - Innovative Research Grant
 - 2019-2020 saw 15 pre-proposals, 4 full proposals

- Dr. W. Travis Horton, Purdue “Surface De-Icing in heat Pump Fins by Local Morphing Concept”
- 2020-2021
 - 19 pre-proposals reviewed on Saturday
 - 4 invited to submit full proposals in the spring
- PES and PMS Training is:
 - Strongly recommended
 - Will be given with instructor at most needed time of year
 - Available on-line anytime
 - Very good for people who want to understand the job before signing on
- Remember that the WS proposal evaluation criteria are used to evaluate proposals

Kathleen Owen	Owen Air Filtration Consulting	Kyung-Ju Choi	Clean & Science
Kevin Kwong	LMS Technologies	John Zhang	3M
Victoria Binz	Dynamic AQS	Bill Hutzal	Purdue-RAC
Caitlin Naske	Dynamic AQS	Chang-Seo Lee	Concordia Univ
Dean Tompkins	Air Chemistry Lab	Lexuan Zhong	Univ of Alberta
Antonios Tasoglou	RJ Lee Group	Ardeshir Meftakheuri	UT Austin
Wim Maassen	Royal Haskoning DHV	Vivekanand Gaux	Columbus Industries
Brian Krafthefer	BCK	Bernard Olson	Univ of Minn
Sanjeev Hingorani	Lennon Ind	Chuan He	Delos Living LLC
Matt Middlebrooks	Filtration Group	Yiwen Di	Delos Living LLC
Jensen Zhang	Syracuse	Mick Flom	3M
Gemma Kerr	Canada	Christine Sun	Waterloo Filtration Inst.
Atila Novoselac	UT Austin	Paula Levasseur	LMF Services
Mangjia Tang	UT Austin	Dan Haas	Parker Hannifin
Himanshu Jasuja	3M	Kjarash Kiantaj	LMS Technologies
Pete Freeman	Jacobi Carbon	Lubos Forejt	Honeywell
Lane Flora	Jacobi Carbon	Rahul Bharadwaj	Lydall
Jeff Roseberry	ProMark Associates	Behnaz Shoar	Lydall
Daniel Mason	Bioclimatic	Scott Sherwood	Eco Care NY
Peter Shipp	InnGage Solutions	Marilyn Listvan	Listvan Consulting
Nick Day	Diatomix	Chris Hsieh	Trane