

## **IAQ RADIO+**

Show Number: 755 Draft Blog

### **Wane A. Baker, P.E. CIH (retired) The V in HVAC**

Good Day and welcome to IAQ Radio+ episode 755+ blog. This week we welcomed Wane Baker back to discuss the V in HVAC and much more. Wane recently retired after teaching the last 11 years at the Trane Graduate Training program. Prior to retiring from Trane, he worked as an IEQ / EH&S professional on a full-time basis for nearly 25 years. He recently contributed to the AIHA Guidance Document “Aerosolized Transmissible Diseases” during which the discussion of ventilation was a hot topic. We had to get him back to share his knowledge with our audience at least one more time.

#### **Nuggets mined from today’s episode:**

Wane Baker officially retired in February of 2024. He enjoys puttering around the house, hanging out with their dog, and reading about IAQ and HVAC which he considers fascinating. To get out of the house he has taken a job at Home Depot.

#### **Risktakers**

When Wane and Dawn Baker moved from the Twin Cities where there were over 1,000 potential employers to the small college town of La Crosse, Wisconsin where there were only 3; they were justifiably hesitant about his potential employment options.

In 2013 at a local ASHRAE meeting after making a presentation; Wane approached an acquaintance who worked for Trane if there might also be an open employment slot for him? Fortunately for Wane, his inquiry led to a successful interview and a position as an instructor at the Trane Graduate Training Program (GTP) where Wane spent the final 11 years of his career instructing the GTP program.

#### **Trane Graduate Program**

The Trane Graduate is a 20 week program that teaches 40-60 newly minted engineer employees of Trane the practical things that they didn’t learn in engineering school ‘which is everything practical’ and prepares them for sales roles at Trane. This program, started by Reuben Trane in 1925 will soon be 100 years old. Attendees are selected by Trane’s sales department and come from across the globe. Wane describes the program as a mini-masters program. [8 weeks is spent

on fundamentals (heat transfer, psychrometrics, system componentry, coil selection, etc.) 8 weeks is spent on system design, and the final 4 weeks are spent tying it all together.]

### ***How did COVID affect your time at Trane?***

Trane during Covid was horrible. Graduate students were stuck in the hotels of a small town and were forced to learn remotely. Students and faculty missed the personal connections of classroom learning. Homework and examinations needed to be reworked.

Due to global supply chain issues, Trane had difficulty obtaining needed parts and components which led to long lead times grinding production to a halt.

### ***Mechanical Ventilation During Pandemic Outbreaks?***

The conversation explored the challenges and solutions during the COVID-19 pandemic. It is widely recognized that in the event of a pandemic HVAC systems are incapable of protecting building occupants and need to be augmented with additional portable air cleaning devices. Considerations include: the importance of mechanical ventilation, the hierarchy of controls, and the Swiss cheese model for risk mitigation the importance of layered approaches to risk mitigation.

Wane discussed the importance of mechanical ventilation during outbreaks, emphasizing the need to maximize outdoor air intake and improve filtration using higher MERV filters. He highlighted discrepancies in the definition of ventilation air across ASHRAE documents, noting that while some define it as outdoor air only, others include recirculated air that has been treated. Wane also explained ASHRAE Standard 241, which was developed in response to the pandemic to increase ventilation rates significantly, aiming for 5-6 air changes per hour to reduce infectious aerosol concentrations. He advised practitioners to clarify ventilation definitions with clients to avoid misunderstandings.

Link to AIHA Guidance Document on Aerosolized Transmissible Diseases.

<https://www.aiha.org/education/guidance-documents/aerosolized-transmissible-diseases>

Link to the previous episode with Bill Bahnfleth discussing ASHRAE Standard 241 on IAQradio <https://www.iaqradio.com/bill-bahnfleth-phd-pe-ashrae-control-of-infectious-aerosols-standard-the-future-of-iaq-standards-after-covid/>

### ***Airborne Transmission of SARS-CoV-2***

The discussion focused on how viruses, particularly SARS-CoV-2, are transmitted through the air. Wane explained that small particles (microns in size) containing the

virus can remain airborne for extended periods, challenging the previous belief that proximity was the main transmission route. He emphasized that ventilation, through frequent air exchanges, can help dilute these airborne particles, while masks primarily serve as source control to prevent infected individuals from spreading the virus. The conversation also touched on the role of relative humidity, noting that viral viability is reduced at relative humidity levels between 40-60%. A U-shaped curve shows greater spread at lower or higher RHs.

### ***Indoor Air Purification Technology Risks***

The discussion focused on the effectiveness and potential risks of various indoor air purification technologies, particularly ozone, hydroxyl radicals, and UV lights. In addition to claiming biocidal effects, the systems often claim to also reduce levels of VOCs.

Wane explained that these technologies can be effective in reducing viral loads when mounted on upper walls of patient rooms. UV is also very effective for air sterilization when mounted downstream from air handler and keeping cooling coils clean when directed onto downstream side of cooling coils.

While the intentions may be good to inactivate viral loads hydroxyls, bipolar ionizers, dry peroxide are all reactive. Chemical reactions can occur in the air and on surfaces. There are concerns about unexpected byproducts, such as the breakdown of refrigerants R152 A (aerosol can propellants) into harmful chemicals. UV lights can prematurely degrade internal electrical HVAC system components and react with materials in ductwork to create odors, emphasizing the need for careful consideration and communication with customers about potential risks (Cost, Benefit, Hazard Analysis). Wane recently had a new furnace and AC unit installed in his home and declined installation of UV light in his system.

***According to the current evidence, where is the sweet spot for ventilation rates?***  
17 CFM per person.

***What did we get wrong during the pandemic?*** Focus on handwashing, surface cleaning, belief that the 6' rule provided protection, misunderstanding how Covid spread.

### **RoundUp**

- MERV 13 filters remove 80% of Covid particles
- .12 micron virion are part of larger 1 micron sized viral nuclei droplets. These wet droplets desiccate quickly and when dry float for hours.
- The draft of the newly revised ASHRAE 241-2023 document on Control of

Infectious Aerosols is available for public review on the ASHRAE web site.

[https://ashrae.iwrapper.com/ASHRAE\\_PREVIEW\\_ONLY\\_STANDARDS/STD\\_241\\_2023](https://ashrae.iwrapper.com/ASHRAE_PREVIEW_ONLY_STANDARDS/STD_241_2023)

- During a pandemic 5-6 air changes per hour is recommended; with air that doesn't contain the target hazard.

### **Wane's Last Word:**

The conversation concluded with Wane praising the hosts for their work on IAQ Radio and expressing gratitude for the opportunity to share his expertise.

### ***Z-Man signing off***

### ***Trivia-***

The founder of the TRANE Company, was an immigrant from what country?

Answer:

Norway

Answered by: John Lapotaire, Indoor Air Quality Solutions, Sanford, Florida

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