



Episode 649 | December 17, 2021 | 12:00 PM EST

## Terry Brennan

### The Life and Times of an IAQ Legend

This week on IAQ Radio+ we welcomed Terry Brennan for a look back and forward with a true legend in the building science and IAQ world. Terry Brennan is a building scientist and educator, who has studied buildings since the 1970's. Because of his background in physics, biology and building construction, Mr. Brennan combines theory and practice in a unique and integrated way. He was president and senior building scientist at Camroden Associates, Inc in Westmoreland NY from its founding in 1984 until 2019.

Terry began his career as a physics major at Northeastern University, but somehow, some way got diverted into building science, working on the earliest research into radon problems and radon behavior in buildings, and moving on to energy and moisture issues. For the last 40 years, he's spent more time crawling around damp basements and hot attics than most normal people would find pleasant. But in return for those decades of investigation, Terry knows a LOT about what makes buildings tick... how they go wrong... and how to make sure they don't.

Mr. Brennan has provided research, training, curriculum development, and program support for the USEPA, the National Center for Healthy Housing, building owners and managers, individual homeowners, and several state health departments. He is the primary author of the [USEPA Moisture Control For Commercial Building Design, Construction, Operations And Maintenance Guidance](#); A contributing author to the ASHRAE Indoor Air Quality Guide, the ASHRAE Residential Indoor Air Quality Guide, and the USEPA Building Air Quality: A Guide for Building Owners and Managers.

He was a member of ASHRAE 62.2 committee on ventilation for low-rise residential buildings for twelve years; a member of ASTM E06 Committee on the Performance of Buildings for 20 years and chaired the Air Barrier Association of America Whole

Building Testing Committee (ASTM WK35913 Collaboration New Standard — Whole Building Enclosure Air Tightness Compliance which became ASTM E3158 ). He served as a consultant to the National Academies of Science Committee on Dampness and Health in Buildings and presented testimony to the IOM Committee Indoor Air Quality and Climate Change.

### **NUGGETS MINED FROM TODAY'S SHOW:**

Terry, who is mostly retired now and still provides guidance to friend and family; spends most of his time with his family.

Terry attributes his involvement with IAQ as accidental. The oil embargos resulted in energy shortages and piqued interest into lowering energy consumption. Terry opined that it was easy to air tighten homes by a factor of 5X and when houses were tightened indoor moisture always increased. Terry who was trained in science took measurements and figured stuff out. At a 1970s lecture at Antioch University on Ventilation, Ventilation Rates & Indoor Contaminants, Terry got hooked on IAQ.

Investigating radon helped Terry understand that air moves through buildings in crazy ways. Outdoor air draws radon into buildings, the soil concentration is the determining factor of how much radon gets in.

In the early 1990s, the EPA commissioned Terry, Bill Turner and Richard Shaughnessy to study schools with high radon levels and make radon interventions. They studied a school in Maine in which most of the exhaust ventilation was disabled. They restored the ventilation system and ventilation rate to 10 CFM per person and were concerned that radon would increase due to depressurization. The radon rate went down by a factor of 7- pressurizing the building would have reduced the radon even more. The researchers widened the study to also include: laser particle counts, Harvard PM10, Total VOCs (speciated VOCs) and bioaerosols.

Photo: Terry inside air handler between intake louvers and air filter bank. Terry commented that it was hard to get a pitot tube traverse so he disconnected the flow sensing element and did the traverse on the air filters.

Photo: Built a temporary duct extension (from plastic pipe and plastic film) to a rooftop air-handler to enable measurement of air flow and pressure differential.

Terry attributes 50% of his building investigation caseload to crazy airflows. He contributed 80% of it not keeping a building: clean, dry and pest free.

Terry learned the most from people who came to hear him speak, commenting that an attendee suggested “people are a big source and they do stupid stuff”.

Terry Brennan’s Law #1: No solution so well thought out or executed cannot be overridden.

Photo: “Start where the client is at”. (Florence Hollis) Remember who you designing, building or maintaining for.

Photo: Woman allergic to cats holding cat. “Intellect is a flyspeck on the sea of emotion.” People decide emotionally not logically.

Photo: Light fixture intentionally placed near thermostat sensor so that occupants could increase air conditioning.

Photo: Post construction engineering. Client chiseled top of wooden door casing so that new storm door could open.

Photos: School classroom with kids is an unusual place where kid’s energetic brains are figuring stuff out. Installed solar panels on exterior of the building with polycarbonate protective covers, the kids figured out how to break the polycarbonate. The solution was to install glass covers, everyone knows what happens when glass breaks.

Tennis balls stuck in HVAC intake louver. Kids figured out what would fit and how to get it in.

Takeaway: Don’t put monitoring equipment in science labs because kids will mess with the equipment.

Photo: Reason for investigation, diesel fume complaints. Sign inside custodial closet in upstate NY. “Due to cold weather leave faucets running.” Diagnosis, big air break blowing cold air across the pipes.

Photo: Looking and seeing are not the same thing. Hearing and listening are not the same thing.

Photo: Reason for investigation, mold smell. Condensation inside plastic fire alarm box in Florida school. Condensation was occurring on interior of demising wall. No measurements were needed, he looked and saw what was happening.

Photo: 3 story apartment building in Syracuse, NY. It's snowing and all windows on top two floors are open. Single pipe steam system, no ventilation. Stack effect top floors to be too hot and ground floor cold.

Photo: Machinist 100 power microscope retrofitted with LED reflected light. Can see mold fruiting bodies.

Photo: Theatrical fog generator for tracing air patterns. People believe what they see.

Photo: Don't be afraid to make a hole.

Photo: Computer servers failing in library following water leak and remediation. Zinc coating came off metal, became airborne and was drawn into servers by their cooling fans.

Accomplishments about which Terry is most proud: doing blower door testing in large buildings and his work on ASTM E51.38 Blower Damage Standard, and his work on the EPA Moisture Control Guide.

The answer to most building science questions is, it depends. (Joe Lstiburek)

## ROUNDUP

John Downey- Healthy Buildings 2021 update. The theme of the event is Research to Practice, how researchers and practitioners can work together. Both Terry Brennan and Greg Whitely have experience going in both directions. Many graduate students and young professionals are attending. Hawaii is determined to open up. Travel costs for flights to Hawaii are surprisingly low. Live stream of the event is available.

Terry Brennan- There is a two way bridge between research and practice. Terry learned by reading research papers, participating in research and applying what he learned in the field. Practitioners see stuff first. The future will be challenging because equipment and materials are changing rapidly. He is counting on younger people to fix what the old guys got wrong. Covid changed IAQ in big ways. It's clear

that COVID is an indoor air and ventilation issue. COVID exposed the importance of good quality indoor air. COVID exposed weaknesses in both worldwide and national health organizations.

Pete Consigli- Terry was wearing a tee shirt promoting Henry Gifford's book, "Buildings Don't Lie". And Terry doesn't lie. Pete gave shoutouts to people in the audience who had attended past Building Science Corps. Summer Camps. Pete remembered that Terry Brennan introduced himself as "a guy who knows stuff" and that Henry Gifford introduced himself as "an old boiler mechanic". Terry's wife is an accomplished gourmet cook and demonstrated her skills at Summer Camp. Pete is also a big promoter of Joe Lstiburek's and Henry Gifford's books. Pete reminisced about a night at Joe Lstiburek's home when someone complained that there was no hot water upstairs. Henry Gifford was also in attendance and yelled up the direction to flush the toilet. After listening to the plumbing sounds, Henry was able to diagnose the problem. Young people are going to Hawaii to attend Healthy Buildings 2021 and Jon Isaacson is encouraging his DYOJO podcast listeners to attend AEML's Winter Break in Florida.

Terry's Brennan's Final Comment: Be Safe!

*Z-Man Signing Off*

*Trivia Question:*

In 1993, the New York City Department of Health and Mental Hygiene first issued recommendations on addressing mold growth indoors? Who was the editor of the document?

Answer: Christopher D'Andrea