

Trouble in the air

Solving indoor air quality problems keeps Enviro Team professionals on the scent

Application Note

Testing Functions Case Study



Measuring tools: 975 AirMeter™, 983 Particle Counter, 971 Temperature Humidity Meter, 922 Airflow™ Meter/Micromanometer, CO-220 Carbon Monoxide Meter

Operator: Enviro Team

Tests conducted: Temperature, humidity, velocity, pressure, particulate, CO, CO₂

Something about this job just didn't smell right

It was a brand new house in a high-end development—a place anyone would be proud to call home. But inside, it stank. So like thousands of others, the bewildered general contractor called the indoor environmental specialists at Enviro Team Group.

"We get called in where no one else has been able to figure out what's going on," said Patrick O'Donnell, Enviro Team's founder. "It could be a situation where people are not feeling well in an indoor environment. It could be related to an odor response." It could be a lawsuit. It could be a builder's nightmare.

Since 1993, Enviro Team has been sampling the air, testing for moisture and particles, analyzing mold and sniffing out perplexing air quality problems in the U.S. and across the Caribbean. Headquartered in Pompano Beach, FL, the eight person company is ideally located to serve a region where heat and humidity are tourist attractions, and the air quality problems they can cause are commonplace.

O'Donnell began his career in 1973 as an HVAC technician. In 1981, he started diagnosing indoor air quality problems, and built a national reputation as a Sherlock Holmes of air quality. He has trained more than 5000 professionals in a variety of air

quality disciplines. He wrote the Certified Indoor Environmentalist training program, the Ventilation System Mold Remediation certification program for the National Air Duct Cleaners Association, and numerous other programs and papers. A high-performance driving instructor and instrument-rated pilot, O'Donnell has often flown Enviro Team's Beech Baron airplane to project sites.

Who you gonna call?

Who calls Enviro Team? Building owners, homeowners, law firms, insurance companies, general and air conditioning contractors, government agencies and professional associations. Anyone with an indoor air quality issue, from a homeowner with leaking windows to the unhappy owner of a new, multi-million dollar yacht. Big money is often at stake, and lawsuits are common.

"The legal process for forensics is a daily activity for us," O'Donnell said. "We are either working on behalf of plaintiffs, or working for the defense."

"We have a standard approach," he added. "Our initial activities are asking questions and listening. We will try to obtain background on what it is the client is trying to achieve. What problems have been encountered? What has been done to try to identify or mitigate the problem?"

With background gathered, O'Donnell's team goes to work. They may test such factors as temperature, humidity and dew point, air pressure and flow, airborne particle counts, moisture levels in materials and inside wall cavities, check for volatile organic compounds (VOCs) and collect biological samples for lab analysis.

The potential problems are countless, and being wealthy is no defense. The new owner of a multi-million dollar yacht asked Enviro Team to identify odors that kept him from occupying the vessel. "They came aboard and they couldn't stay on the yacht because of formaldehyde and VOCs," O'Donnell recalled. "We did a calculation to determine the dilution rate and how long the smell would persist. The owners were happy and they went on their way."

When a challenging environment interacts with inadequate construction or maintenance, air quality can suffer. Whether in moist, stormy Florida or bone dry Texas, the outside environment contributes to many Enviro Team indoor projects.

In the desert, too much water

"We deal with a lot of water vapor issues, which results in condensation or mold or product damage," O'Donnell said. "We work all over the Caribbean and the U.S., the lion's share in hot and humid climates. But we worked several years ago in the Chihuahua desert." How could moisture problems affect a school district in the desert? "They may only get five inches of annual rain, but when they get it, they get it," O'Donnell said. "Because they didn't get a lot of rain, they didn't pay a lot of attention to where water could come in."

Attention to such details is Enviro Team's specialty. "We do a lot of water spray and water sheeting testing, to identify and document building envelope problems associated with windows, doors and other exterior features," he said. "We're checking to find out where leakage is occurring, and after they rectify it, we're checking to find out how effective the fix is." The key tools: humidity testers, moisture meters and thermal imaging cameras that make it possible to see where water is traveling.

Even airborne ultrasound helps out. In one perplexing case, Enviro Team was brought in to determine why the wall-board in a clubhouse was turning moldy. The building had a new roof and skylight, but a thermal camera detected no evidence of leaks, even after a Florida thunder storm. Yet the mold showed moisture was there. O'Donnell's team placed an ultrasound tone generator inside the building, then went up on the roof with a microphone. They found the sound, escaping from gaps between the new roof and walls that allowed humid Florida air into the cooler interior of the building. There the moisture condensed and created ideal conditions for mold to grow. Case closed.

Think you might hit the road to escape indoor air quality problems? Think again. Motor homes have air problems, too. Enviro Team has found an air conditioning inlet so close to a generator exhaust that it drew exhaust gas inside.

Even a jet can't get away from indoor air trouble. O'Donnell once analyzed the air inside a \$15 million business jet, tracking down an irritating odor inside. It turned out the smell was caused by chemi-

icals in the plane's composite construction.

In hospitals, air quality issues can be more than unpleasant. Infection by airborne fungal spores or bacteria can be dangerous, even deadly for patients who are already ill. Enviro Team gets involved in collecting particle samples, growing any biological particles and determining what species may be floating around the facility.

But sometimes even the most advanced tests can't sniff out the problem.

In the case of the stinky house, though anyone entering the home could smell it, spectrometer analysis of the air failed to detect the source of a dank, earthy odor. It turned out that when the opaque skylight material in the home was heated, it produced the malodor. Enviro Team tracked the smell to a skylight that had become compromised when water leaked into an air space within the skylight's plastic dome. The final fix required replacing the skylight fixture.



Fluke IAQ Test Tools

Fluke CO-220 Carbon Monoxide Meter

Quickly and accurately measure CO levels with this easy-to-use compact meter.

The Fluke CO-220 Carbon Monoxide Meter makes it easy to take quick and accurate measurements of CO levels with a single, compact instrument.

Featuring the newest generation of electrochemical sensors, the CO-220 responds very quickly to ambient changes in carbon monoxide concentration without the use of a pump.

The CO-220 is the perfect instrument for technicians and other professionals who need to measure CO levels within spaces such as industrial environments, commercial buildings, or residential dwellings where accumulation of combustion gas is possible.



Fluke 983 Particle Counter

The new Fluke 983 Particle Counter is the preferred choice for HVAC and IAQ professionals. From filter testing to IAQ investigations, the Fluke 983 is the portable solution for determining airborne particle concentrations. Use the Fluke 983 to immediately respond to occupant complaints, or as part of a comprehensive preventive maintenance program.

With the Fluke 983 you can:

- Measure filter efficiency.
- Monitor industrial cleanrooms.
- Pre-screen indoor air quality and confidently work with IAQ specialists.
- Locate particle sources for remediation.
- Report the effectiveness of repairs to customers.
- Drive additional business by demonstrating the need or maintenance and repair.



Fluke 975 AirMeter™

Applications:

- Respond to comfort-related calls from occupants.
- Verify HVAC control systems.
- Determine whether adequate ventilation exists.
- Monitor air flow and velocity.*
- Test for dangerous carbon monoxide leaks.
- Perform duct traversals.

Features:

- Air flow and velocity with available probe*.
- Simultaneously measures, logs, and displays temperature, humidity, CO₂, and CO.
- Wet bulb and dew point temperature.
- % of outside air calculation.
- CO₂ and CO field calibration feature.
- Self-test function at startup.
- Auto-backlight LCD display.
- Automatically compensates for barometric pressure changes.
- Min/Max/Average on all measured and calculated readings.
- Audible and visual threshold alarms.
- Extensive discrete or continuous data logging capacity, downloadable to PC via USB interface.
- FlukeView Forms® software.

*Included with Fluke 975V, optional with Fluke 975.



Fluke 971 Temperature Humidity Meter

Quickly take accurate humidity and temperature readings in the air. Temperature and humidity are two important factors in maintaining optimal comfort levels and good indoor air quality. The Fluke 971 is invaluable for facility maintenance and utility technicians, HVAC-service contractors and specialists who assess indoor air quality (IAQ). Lightweight, rugged and easy to hold, the Fluke 971 is the perfect tool for monitoring problem areas.

Features

- Backlit dual display of humidity and temperature.
- 99 record storage capacity.
- Ergonomic design with belt clip and protective holster.
- Quick-response capacitance sensor with twis open protective cover.
- Compact and lightweight 190 g (6.7 oz).
- Temperature range from -20 °C to 60 °C (-4 °F to 140 °F).
- Measures dew point and wet bulb.
- Relative humidity from 5 % to 95 %.
- Min/Max/Avg data hold.
- Low battery indicator.



Fluke 922 Airflow™ Meter/Micromanometer

Applications

- Measure pressure drops across key HVAC equipment to drive peak performance and extend equipment life.
- Match ventilation to occupant loads.
- Monitor indoor vs. outdoor pressure relationships and manage the building envelope.
- Promote indoor comfort and quality.
- Perform duct traversals for accurate airflow readings.

Features

- Powerful meter provides differential and static pressure, air velocity and flow readings.
- Convenient colored hoses help proper interpretation of pressure readings.
- Easy to use without sacrificing performance.
- Bright, backlit display for clear viewing in all environments.
- User-defined duct shape and size for maximum airflow accuracy.
- Resolution down to 0.001 in H₂O.
- 99 point data storage capacity.
- Min/Max/Average/Hold functions for easy data analysis.
- Auto power off saves battery life.



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