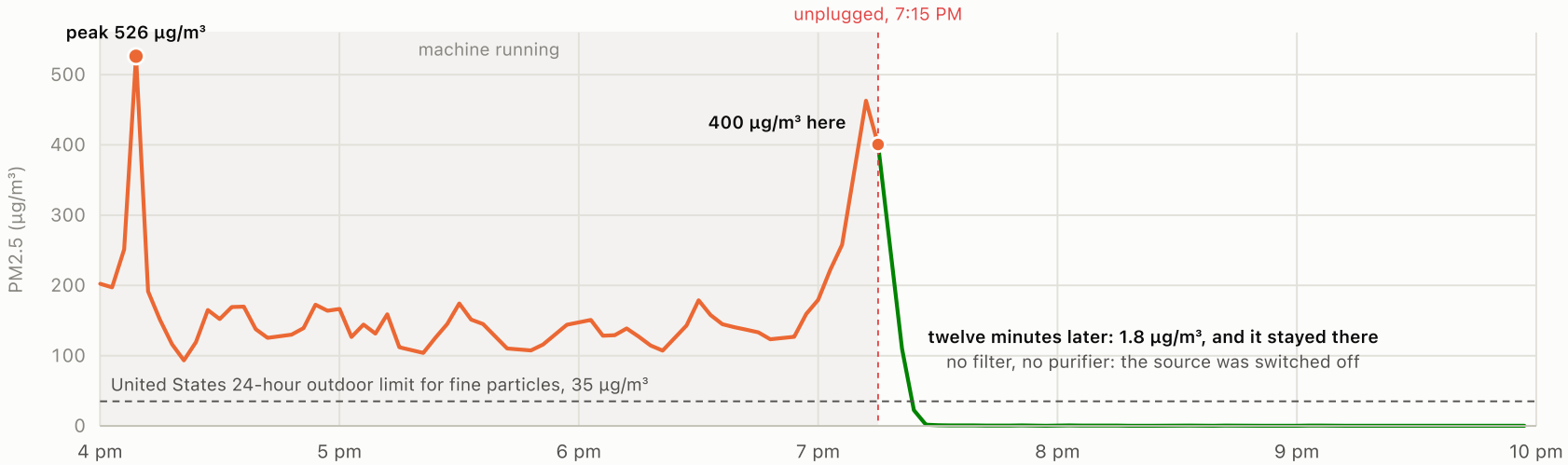
# The dehumidifier that dried the air while filling it with particles

Single-family home, southern Wisconsin · finished basement plus main floor · two Overture Room Sensors · July 2 to August 28, 2026 · all times Central

**Two sensors went into this house on July 2 and landed in the middle of a problem nobody could see.** The basement spent 71 of its first 73 monitored hours above the United States 24-hour outdoor limit for fine particles, peaking at 526 µg/m³, while every moisture reading said the room was in good shape. Both were true. The dehumidifier was genuinely drying the air and, at the same time, throwing its own tank water back into the room as a fine mineral aerosol. The on-site check found the reservoir full and the condensate line reduced to a bare drip. Unplugging the unit dropped fine particles from 400 µg/m³ to 1.8 µg/m³ in twelve minutes. Eight weeks later the basement is still averaging under 1 µg/m³.




Basement fine particles, 3-minute samples — After the machine was unplugged

**526** µg/m³
peak fine-particle level in the basement, 15 times the United States 24-hour outdoor limit

**97** %
of the samples taken before the fix sat above that 35 µg/m³ limit

**12** min
from 400 µg/m³ to 1.8 µg/m³ once the machine was unplugged

**144** ×
cleaner today: 141 µg/m³ before, 0.98 µg/m³ through August

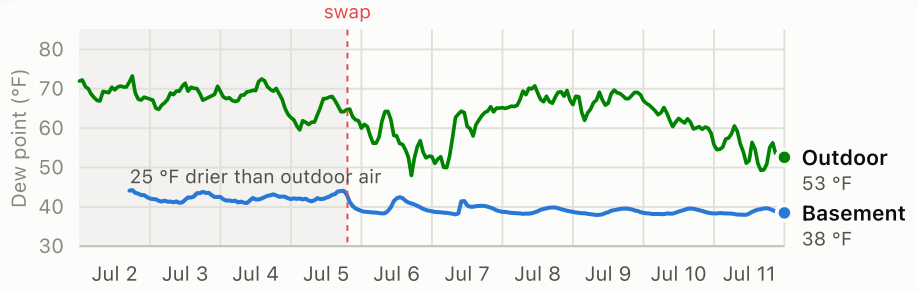
# Why every ordinary check would have passed this machine

A dehumidifier is judged on its moisture numbers, and this one was winning. Across roughly 70 hours the basement dew point sat a median 25 °F below the outdoor dew point and never came closer than 17 °F. Air leaking in from outside cannot produce a gap like that. Only a working machine can. Anyone reading the dial, or a relative humidity gauge on the wall, would have called this unit healthy. Dew point is the honest variable here: it tracks the partial pressure of water vapor in the room and does not move when the temperature moves.

## Three details pinned the source

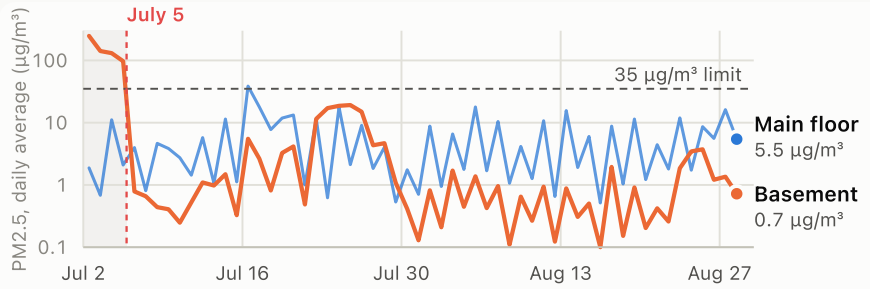
- **It ran at night with nobody down there.** A pulse to 282 µg/m³ at 3:03 AM on July 5, carbon dioxide flat, the household asleep upstairs. Machines make particles at three in the morning. People do not.
- **Relative humidity sat at 35 to 41 percent throughout**, far too dry for water droplets to register as particles on an optical sensor. These were real solids.
- **The main floor stayed near zero** through the same window. The source was basement-local.

**The mechanism.** A full reservoir, a condensate line down to a drip, and a fan still turning. The unit was splashing and re-aerosolizing its own condensate, and when one of those droplets dries in mid-air the minerals dissolved in it stay behind as genuine airborne particulate.




Basement dew point — Outdoor dew point

The gap never closes, because the machine never stopped drying the air. The particle channel was telling the opposite story at the same moment.




Basement, daily average — Main floor, daily average

Fifty-eight days on a logarithmic scale, so three decades of change fit on one axis.

**What this means for your buildings.** A dehumidifier that is still hitting its moisture target can be the largest particle source in the space it serves, and no moisture reading will reveal it. What identifies it is specific: sustained fine particles in a room where the dew point record proves a machine is actively drying the air. Overture watches both channels on one sensor at a three-minute cadence, which is why this took four days to find instead of never.

Overture Room Sensors, 3-minute polling. Fine particles are PM2.5 in micrograms per cubic meter; 35 µg/m³ is the United States 24-hour outdoor standard. Dew point in degrees Fahrenheit; outdoor conditions from the regional feed. Era averages 141.0 and 0.98 µg/m³. Site anonymized. 