

Indoor Air Quality *Assessment*

Six-zone evaluation — [Property Address]

DATE July 14, 2026	ON-SITE WINDOW 9:21 - 11:08 AM	ZONES TESTED 6 zones	REPORT STATUS Monitor
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§ 01 Executive Summary

This report presents indoor air quality measurements collected across six zones at [Property Address] on July 14, 2026. Three instruments were deployed together: an AirGradient multi-sensor (PM1, PM2.5, PM10, CO2, TVOC, VOC Index, NOx, temperature, humidity), a Temtop portable unit (PM2.5, PM10, CO2, formaldehyde, temperature, humidity), and an EasyLog electrochemical carbon monoxide monitor. All readings are short, real-time spot measurements describing conditions at the time of testing, interpreted against residential indoor-air targets rather than long-term regulatory averages (see Methodology).

Carbon monoxide was undetectable in all six zones — including the workshop, a space where combustion equipment commonly introduces risk. That is the most important safety result and it is unambiguous. **The finding that warrants attention is ventilation:** carbon dioxide rose from roughly 315 ppm outdoors to approximately 1,020–1,180 ppm throughout the home and stayed there for the entire visit, sitting at or above the ASHRAE reference of 1,000 ppm in every indoor zone. Chemical measures were reassuring — TVOC ranged 87–135 ppb against a 220 ppb guideline, the VOC Index tracked near its baseline, and NOx read a clean 1 everywhere.

One measurement is unresolved. At the closest vent, the two co-located particulate sensors disagreed by roughly 4.4× (19.3 vs 4.4 ug/m3). They agreed closely outdoors, so this is not a fixed calibration difference, and the gap persists after the settling period is excluded. Both values are reported below and the reading is flagged for re-measurement rather than presented as settled.

EXCELLENT / ACCEPTABLE CO, TVOC, VOC Index, NOx, PM10 Carbon monoxide 0.0 ppm in all six zones · TVOC 87–135 ppb vs 220 guideline · VOC Index near baseline · NOx = 1 (clean) · PM10 well within limit	MONITOR CO2, HCHO CO2 at 1,020–1,180 ppm throughout the home — at or above the ASHRAE ventilation reference · formaldehyde 0.049–0.053 mg/m3, above the strict target, below the WHO limit	RECOMMEND FOLLOW-UP PM2.5 at vent Co-located sensors disagreed 4.4× at the closest vent; requires a repeat measurement before the particulate picture there can be called
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ACTION REQUIRED

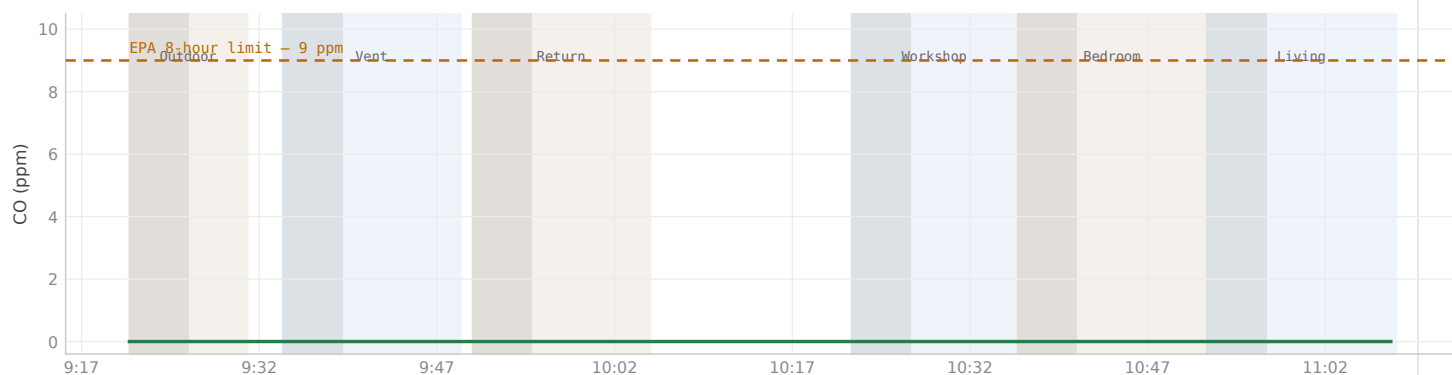
Findings needing follow-up

WHOLE HOME · VENTILATION (CO2)

Indoor CO2 measured 1,022–1,180 ppm across every indoor zone and remained there for the full visit, against an outdoor baseline of about 315 ppm. ASHRAE 62.1 uses roughly 1,000 ppm as an indicator of adequate ventilation; readings at or above that level, sustained rather than momentary, suggest the home is not exchanging enough fresh air for its current occupancy. This is a ventilation observation, not a toxicity finding — CO2 at these levels is not hazardous. Recommend reviewing ventilation strategy: outdoor-air intake, ERV/HRV operation if present, exhaust fan use, and whether the system is set to circulate rather than ventilate.

CLOSEST VENT TO TRUNK · PM2.5 SENSOR CONFLICT

The AirGradient read 19.3 ug/m3 while the Temtop, sitting beside it on the same tray, read 4.4 ug/m3 — a 4.4× disagreement. The same two sensors agreed within 8% outdoors, so this is not a calibration offset. Critically, the gap survives the five-minute settling exclusion: the AirGradient continued to read 17–19 ug/m3 through the valid window while the Temtop held flat near 4.4, so this is not simply a placement artifact. Recommend a repeat measurement at this location with both sensors undisturbed before any particulate conclusion is drawn for the supply air.



A flat zero line across the full session. The monitor sampled every ten seconds and recorded no detectable carbon monoxide in any zone, including the workshop. This is the clearest result in the report.

Instrument coverage. The AirGradient covered all six zones. The Temtop portable unit stopped logging at 10:09 AM — before the workshop measurement began — so the workshop, bedroom, and living room have single-sensor particulate coverage and no formaldehyde reading. The CO monitor ran continuously for the full session. The Temtop's CO₂ channel is excluded from this report; see §03.

§ 02 Measurement Dashboard

This dashboard places every zone's reading on a number line for each metric. The marked point is the recommended limit or the edge of the comfort band; the arrow is the measured value. Green sits within range, amber or red beyond it. Readings are short spot measurements interpreted against residential targets rather than long-term regulatory averages (see Methodology). PM1, VOC Index, and NOx Index are shown as informational values without a pass/fail line. CO2 is from the AirGradient (the Temtop CO2 channel was excluded).

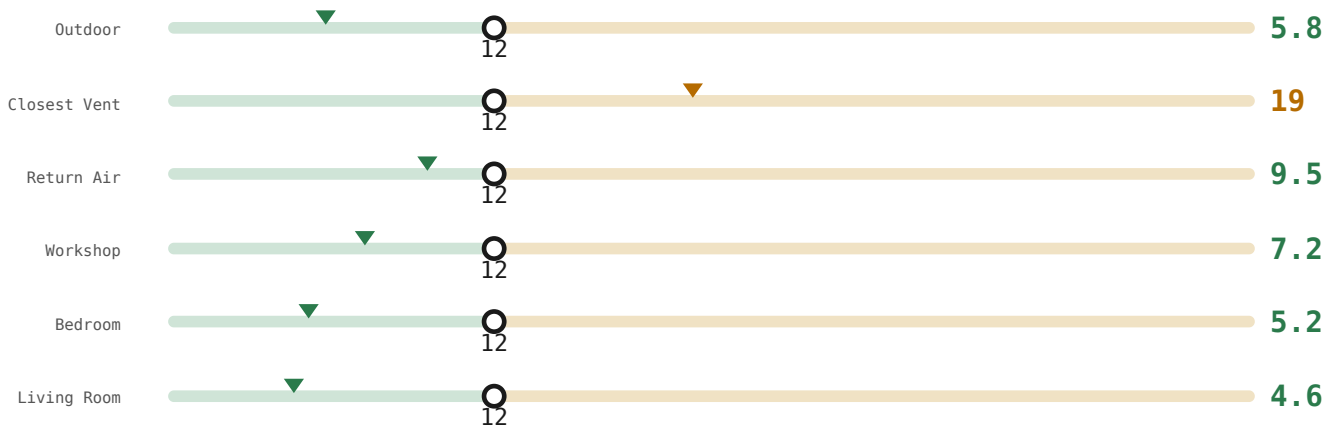
PM1 ug/m3

Informational – no EPA standard

Outdoor	4.4 ug/m3	no standard
Closest Vent	11 ug/m3	no standard
Return Air	5.9 ug/m3	no standard
Workshop	4.7 ug/m3	no standard
Bedroom	3.4 ug/m3	no standard
Living Room	3.1 ug/m3	no standard

PM2.5 ug/m3

Residential good ≤ 12 · EPA 24-hr 35



PM10 ug/m3

EPA 24-hr ≤ 150



CO2 ppm

ASHRAE ventilation ≤ 1,000





TVOC concentration ppb

WELL ≤ 220 

VOC Index idx

Trend signal · 100 = room baseline

Outdoor	93 idx	baseline 100
Closest Vent	101 idx	baseline 100
Return Air	99 idx	baseline 100
Workshop	118 idx	baseline 100
Bedroom	117 idx	baseline 100
Living Room	141 idx	baseline 100

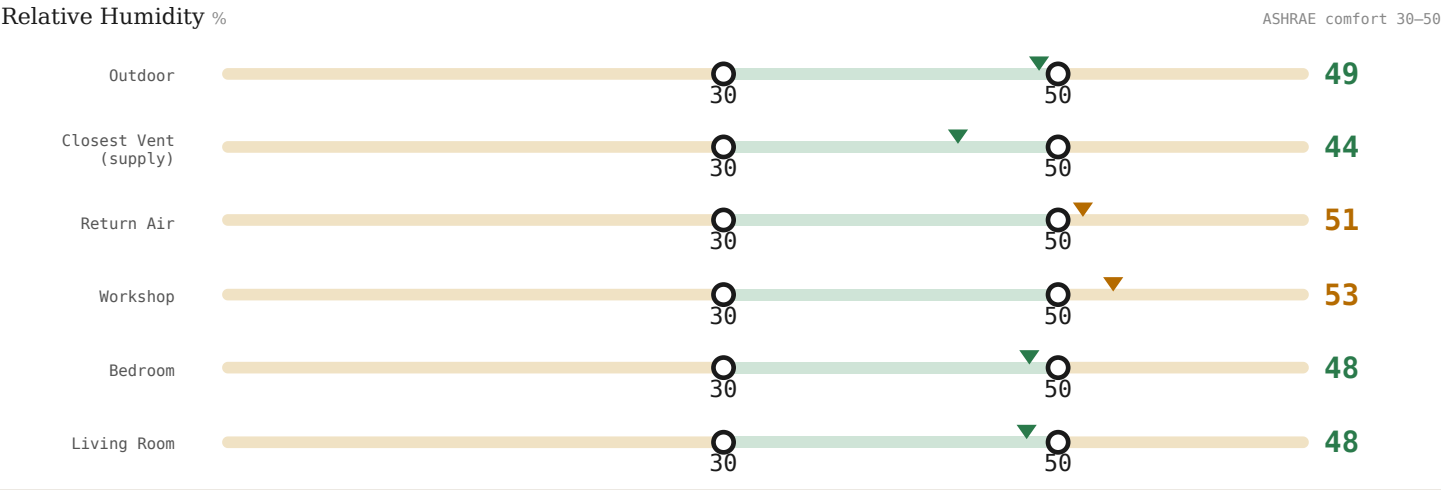
HCHO (Formaldehyde) mg/m3

WHO ≤ 0.1 · strict 0.05

Temperature F

ASHRAE comfort 68–76





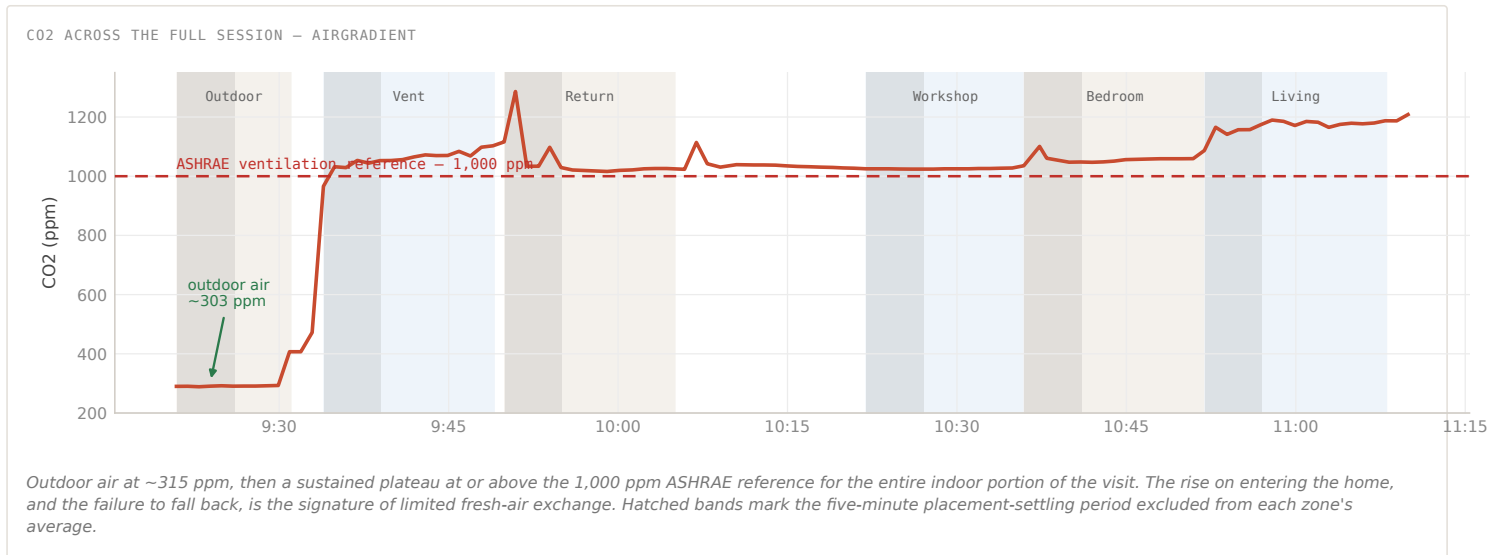
NOx Index idx			Combustion indicator · 1 = clean	
Outdoor	1.0	idx baseline 1		
Closest Vent	1.0	idx baseline 1		
Return Air	1.0	idx baseline 1		
Workshop	1.0	idx baseline 1		
Bedroom	1.0	idx baseline 1		
Living Room	1.0	idx baseline 1		

§ 03 Ventilation — The CO2 Picture

Carbon dioxide is the most useful available proxy for whether a home is getting enough fresh air. People exhale CO2 continuously; if it accumulates and stays elevated, air is not being exchanged fast enough for the number of people in the space. It is not a toxicity measure at these concentrations — the concern is ventilation adequacy, not poisoning.

The pattern here is clear and was confirmed on site. Outdoor air measured approximately 315 ppm. Within minutes of moving indoors the reading climbed to roughly 1,050 ppm and held between 1,022 and 1,180 ppm for the remainder of the visit, across every indoor zone — vent, return, workshop, bedroom, and living room alike. The technician observed this rise in real time during the test and noted it held near 1,000 ppm for the entire indoor period.

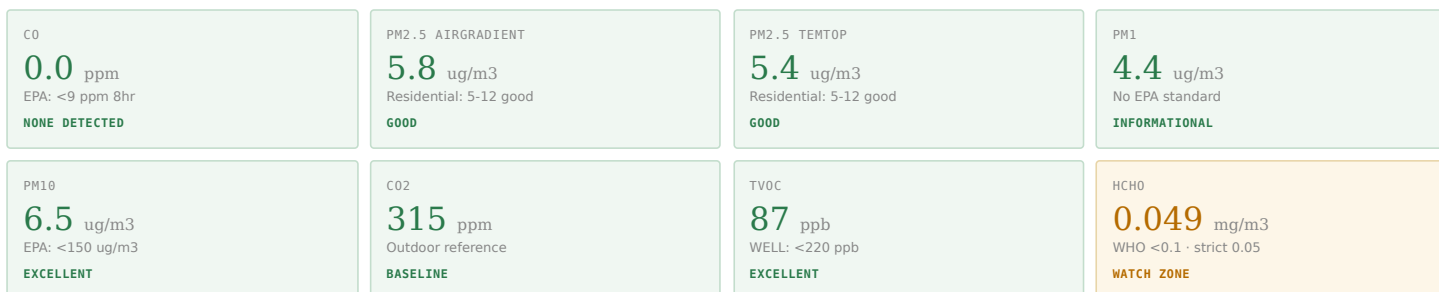
A uniform reading across rooms of different size and use, sustained over nearly two hours, points to a whole-home ventilation characteristic rather than a single room's problem. The living room was highest at 1,180 ppm, consistent with it being the most recently occupied space during the visit.



Why the Temtop's CO2 channel is excluded. The Temtop powered on at 8:20 AM reading 409 ppm — a correct outdoor value. At approximately 8:35 AM it stepped to ~1,030 ppm and never returned, including while sitting outdoors during the 9:21 baseline, where it reported 1,031 ppm for air the AirGradient measured at 315 ppm. Because it was already pinned near 1,030 before going inside, it recorded only a 19 ppm rise across the outdoor-to-indoor transition — it could not show the change the technician observed and the AirGradient captured. The channel is treated as unreliable for this visit and excluded. The AirGradient CO2 readings are corroborated by direct field observation and are reported as valid.

Outdoor Baseline

9:21 – 9:31 AM · read from 9:26
AirGradient + Temtop + CO monitor



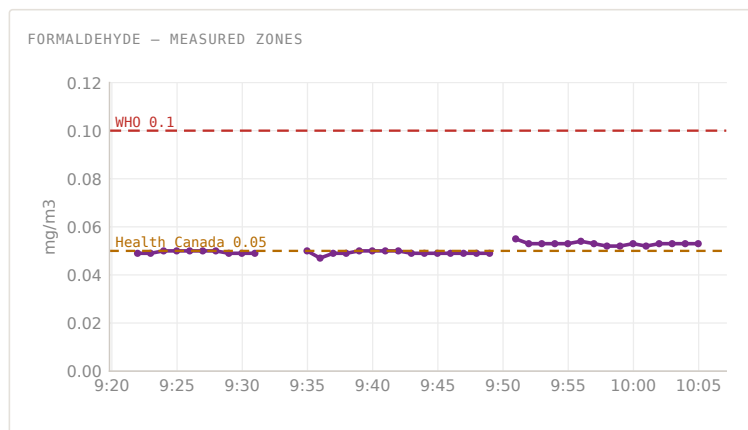
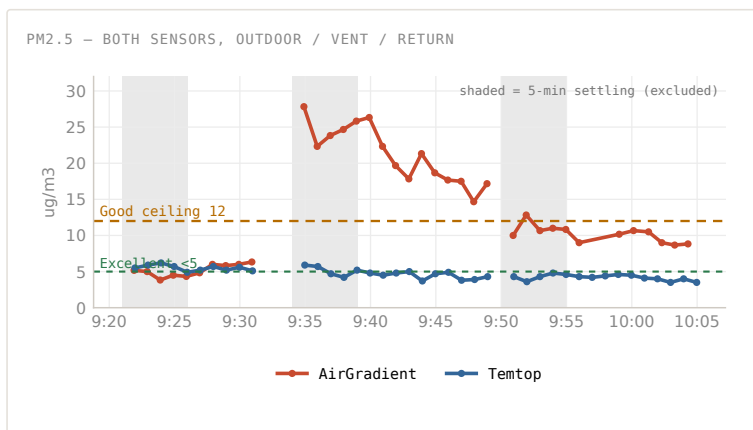
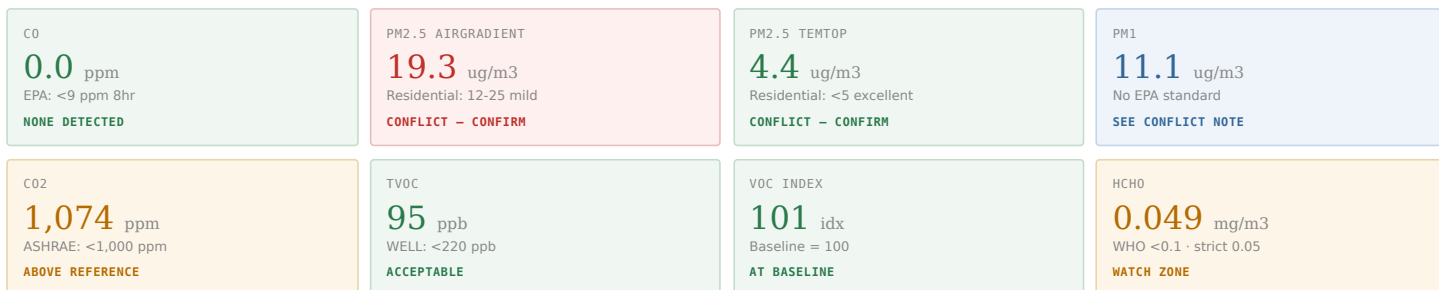
The outdoor baseline was clean and both particulate sensors agreed closely — 5.8 and 5.4 ug/m3, within 8% of each other. That agreement matters: it establishes that the two instruments were consistent with one another before entering the home, which is what makes their later disagreement at the vent significant rather than routine.

Outdoor CO2 measured 315 ppm. Readings in the 250–350 range are common along the Front Range, particularly on a summer morning where nearby vegetation is actively drawing CO2 down; this is a plausible local baseline rather than an instrument error. No carbon monoxide was present. Formaldehyde read 0.049 mg/m3, which is high for outdoor air and, given it held near the same value in every measured zone, most likely reflects a modest offset on that channel rather than a genuine outdoor source.

Closest Vent to Trunk

9:34 – 9:49 AM · read from 9:39
All devices on a tray beside the vent

Sensor conflict — PM2.5 unresolved here. The AirGradient averaged 19.3 ug/m3 and the Temtop 4.4 ug/m3 for the same air, on the same tray, over the same valid window — a 4.4× divergence, against close agreement outdoors. The gap persists after the five-minute settling period is excluded, so it is not merely a placement artifact. Both values are shown below. This reading requires a repeat measurement before the supply-air particulate level can be stated.



This zone produced the report's one genuinely ambiguous result. All three devices sat together on a tray next to the vent, sampling the same air, yet the two particulate sensors told different stories. The AirGradient's reading began at 27.8 ug/m3 and decayed across the window, still reading 17–19 ug/m3 through the valid portion after settling was excluded. Its own internal channels moved together (PM1 11.1, PM2.5 19.3, PM10 20.4), so the instrument was internally consistent. The Temtop, inches away, recorded a flat 3.7–5.9 the entire time and saw no event whatsoever.

We cannot resolve this from the data, and the settling exclusion rules out the simplest explanation. If placement disturbance were the whole story, the AirGradient would have converged toward the Temtop once the first five minutes were discarded; it did not — the divergence held at 4.4x. So either the AirGradient is detecting real particulate near the vent that the Temtop's sensor is not resolving, or the AirGradient's optical chamber was affected in a way that persisted well beyond the settling window. The honest position is that this location needs a repeat reading; we have not averaged the two values together, because averaging a real signal with a false one produces a number that is wrong in a new way.

RECOMMENDED ACTIONS – CLOSEST VENT TO TRUNK

→ **Re-measure PM2.5 at this location.** Place both sensors, allow several minutes of undisturbed settling before recording, and repeat. The 4.5x split must be reconciled before supply-air particulate can be reported.

→ **Inspect filter condition and fit while on site.** Regardless of which sensor proves correct, confirming the filter is clean, correctly sized, and seated without bypass gaps is worthwhile and cheap.

Return Air

9:50 – 10:05 AM · read from 9:55
AirGradient + Temtop + CO monitor

CO 0.0 ppm EPA: <9 ppm 8hr NONE DETECTED	PM2.5 AIRGRADIENT 9.5 ug/m3 Residential: 5-12 good GOOD	PM2.5 TEMTOP 4.1 ug/m3 Residential: <5 excellent EXCELLENT	PM1 5.9 ug/m3 No EPA standard INFORMATIONAL
PM10 10.1 ug/m3 EPA: <150 ug/m3 EXCELLENT	CO2 1,022 ppm ASHRAE: <1,000 ppm ABOVE REFERENCE	TVOC 93 ppb WELL: <220 ppb ACCEPTABLE	HCHO 0.053 mg/m3 WHO <0.1 · strict 0.05 WATCH ZONE

The return plenum draws air from across the home and concentrates whatever circulates, making it the best single indicator of the household's overall particulate load. Both sensors placed it in acceptable territory — the AirGradient at 9.5 ug/m3 (good residential range) and the Temtop at 4.1 (excellent). The 2.3x gap between them is narrower than at the vent and falls below our conflict threshold, but the same caution applies: the AirGradient's reading again decayed across the window, from about 10.7 down to 8.8.

Taking the more conservative of the two, the home's circulating particulate is within the good residential band and requires no filtration intervention. Carbon dioxide at 1,022 ppm matched the rest of the house. Formaldehyde at 0.053 mg/m3 was the highest of the measured zones, consistent with the return concentrating what circulates, but still roughly half the WHO guideline.

Workshop @ Workbench

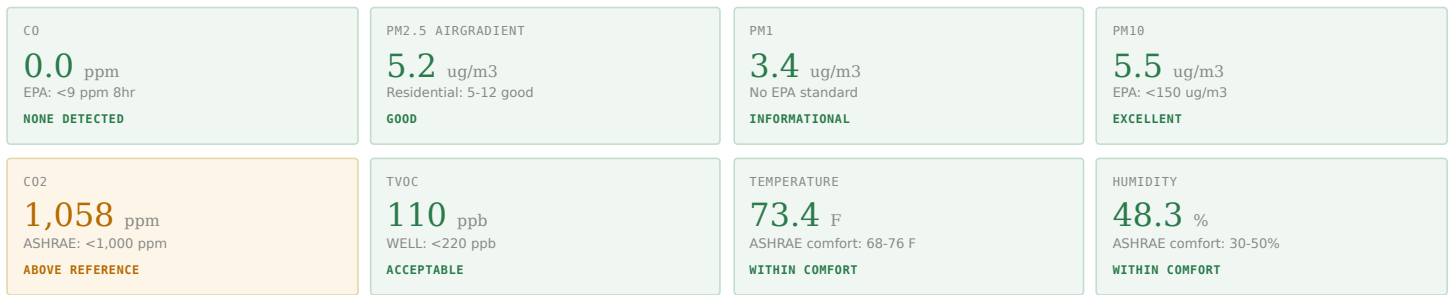
10:22 – 10:36 AM · read from 10:27
AirGradient + CO monitor · Temtop offline

Timing note: measurement began at 10:22 rather than 10:07 because the blower fan continued running until then. Readings therefore reflect settled conditions after the fan stopped. The Temtop had gone offline at 10:09, so particulate here is single-sensor and no formaldehyde reading is available.

CO 0.0 ppm EPA: <9 ppm 8hr NONE DETECTED	PM2.5 AIRGRADIENT 7.2 ug/m3 Residential: 5-12 good GOOD	PM1 4.7 ug/m3 No EPA standard INFORMATIONAL	PM10 7.5 ug/m3 EPA: <150 ug/m3 EXCELLENT
CO2 1,027 ppm ASHRAE: <1,000 ppm ABOVE REFERENCE	TVOC 112 ppb WELL: <220 ppb ACCEPTABLE	VOC INDEX 118 idx Baseline = 100 NEAR BASELINE	NOX INDEX 1 idx Clean baseline = 1 CLEAN

The workshop is the most reassuring result in this report. Workshops commonly house combustion equipment, fuel-powered tools, or vehicles, and are among the most frequent points where carbon monoxide enters a home. Carbon monoxide here measured zero for the full fourteen minutes. The NOx index — a combustion indicator on a separate sensing principle from the CO monitor — read a clean baseline of 1, independently corroborating that no combustion byproducts were present.

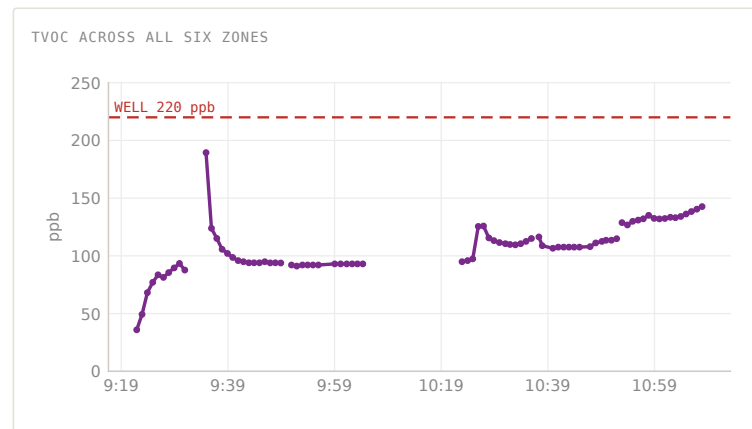
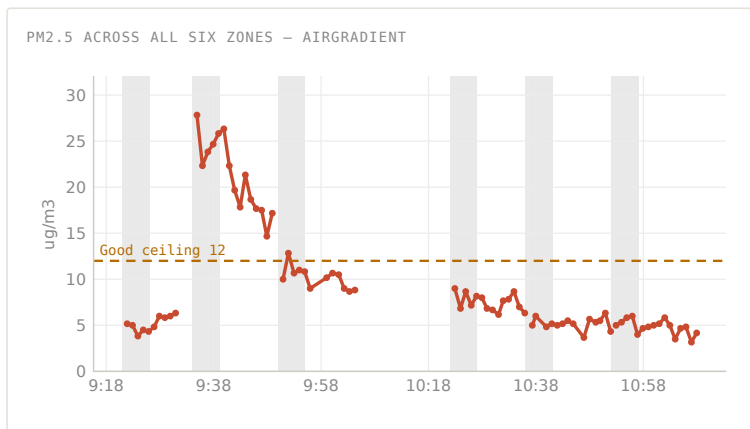
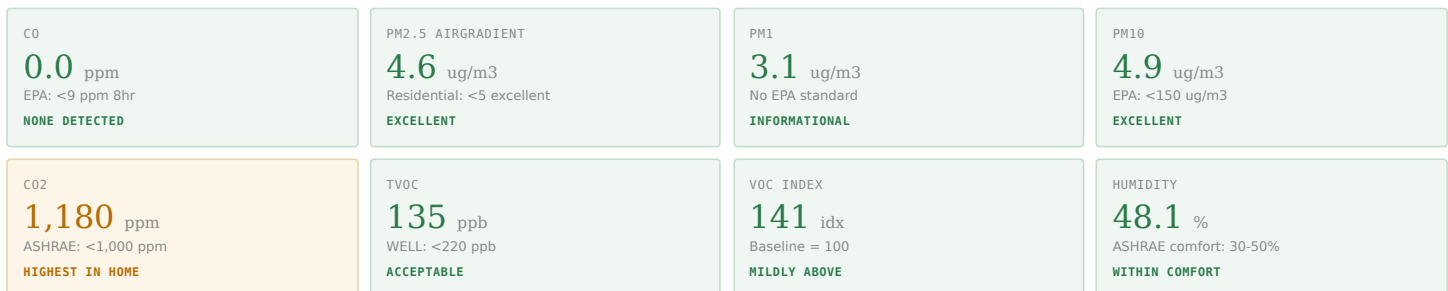
Particulate at the workbench was good (PM2.5 7.2 ug/m3), which is a solid result for a workshop space. TVOC at 112 ppb and a VOC Index of 118 are both unremarkable — slightly above the home's baseline, which is expected where solvents, adhesives, or finishes are stored, but far below the 220 ppb guideline. CO2 at 1,027 ppm tracked the rest of the house, reinforcing that ventilation is a whole-home characteristic here rather than anything specific to this room.



The bedroom at the end of the hall was clean and comfortable. Particulate was among the lowest in the home (PM2.5 5.2, PM1 3.4, PM10 5.5 ug/m3), no carbon monoxide was present, and TVOC at 110 ppb sat well inside the guideline. Temperature at 73.4°F and humidity at 48.3% both fall within the ASHRAE comfort bands.

Carbon dioxide at 1,058 ppm is the one item to note. Bedrooms are where elevated CO2 matters most, because occupants spend six to eight continuous hours there with the door typically closed — conditions under which CO2 accumulates well beyond what a mid-morning spot reading captures. A daytime reading already at 1,058 ppm in an unoccupied bedroom suggests overnight levels would climb considerably higher. This is a ventilation consideration worth raising with the homeowner, not a hazard.

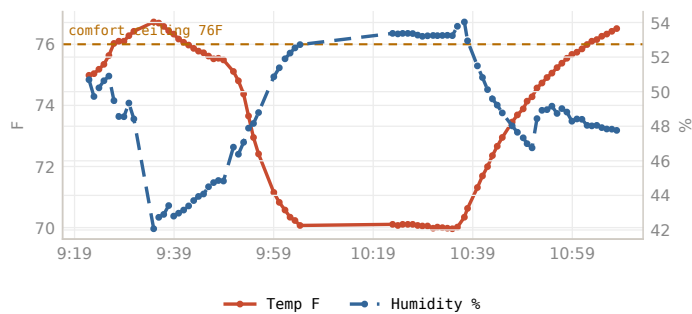
Living Room

10:52 — 11:08 AM · read from 10:57
AirGradient + CO monitor · Temtop offline

The living room had the cleanest particulate readings of the entire visit — PM2.5 at 4.6 ug/m3 sits in the excellent residential band, with PM1 at 3.1 and PM10 at 4.9. Humidity at 48.1% is comfortable. No carbon monoxide was detected.

Two values were the highest of the home, and both make sense together. CO2 reached 1,180 ppm and TVOC 135 ppb, with the VOC Index at 141 — mildly above the room's learned baseline of 100. All three are consistent with this being the most recently and heavily occupied room during the visit: people exhale CO2 and, along with furnishings and household products, contribute VOCs. None approach a threshold of concern; the TVOC remains well under the 220 ppb guideline and the VOC Index elevation is modest. They reinforce the ventilation observation rather than adding a separate finding.

TEMPERATURE & HUMIDITY – ALL ZONES



Indoor temperatures ranged 70.0–76.1°F and humidity 44.0–53.3% across the visit. Both sit within, or at the edge of, the ASHRAE comfort bands throughout.

The warmest reading (76.1°F, living room) is fractionally at the comfort ceiling; the coolest (70.0°F, workshop) is comfortably inside it. Nothing here indicates an equipment problem.

Comfort conditions are reported as an HVAC-performance observation and are separate from the air-quality findings above.

RECOMMENDED ACTIONS – WHOLE HOME

- **Review ventilation strategy.** CO₂ held at 1,022–1,180 ppm in every indoor zone for the full visit against a 315 ppm outdoor baseline. Check outdoor-air intake, ERV/HRV operation if fitted, exhaust-fan usage, and whether the system is circulating rather than introducing fresh air.
- **Pay particular attention to the bedroom.** A daytime reading of 1,058 ppm in an unoccupied bedroom implies materially higher overnight levels with the door closed. Improving fresh-air exchange to sleeping areas offers the most benefit per effort.
- **Re-measure PM_{2.5} at the closest vent** to resolve the 4.4× sensor disagreement (see §03).
- **No particulate, CO, VOC, or NO_x action required.** All were within acceptable ranges throughout, and carbon monoxide was undetectable in all six zones.

Instruments and sampling. An AirGradient multi-sensor recorded PM1, PM2.5, PM10, CO2, TVOC, VOC Index, NOx, temperature and humidity at roughly one-minute intervals across all six zones. A Temtop portable unit recorded PM2.5, PM10, CO2, formaldehyde, temperature and humidity at one-minute intervals until it stopped logging at 10:09 AM. An EasyLog electrochemical CO monitor (serial 100026092) sampled every ten seconds continuously for the full session. All three devices were co-located in each zone.

Placement settling. Every time instruments are set down in a new location they disturb the local air — lifting dust, changing the thermal environment, and unsettling the optical particulate chambers. Readings therefore need time to re-equilibrate to each spot, independently of how long the device has been powered on. **The first five minutes in every zone are excluded from all reported averages;** the figures in this report are drawn from the remaining valid portion of each window. On the charts, the excluded settling period is shown shaded and hatched so the full record remains visible.

A note on window length. Zones on this visit ran 10–16 minutes, which permits a five-minute settling cut but not our preferred ten. Our standard going forward is a minimum of twenty minutes per zone — ten minutes settling, ten minutes valid — which yields a more robust average. The averages here rest on 5–11 readings per zone; they are sound but drawn from shorter valid windows than we would prefer, and that is disclosed rather than glossed.

Spot measurements vs. long-term exposure. These are short, real-time measurements describing conditions at the time of testing. Published standards such as the EPA annual PM2.5 standard are long-term averages built for continuous outdoor exposure and are not pass/fail criteria for a brief indoor session; where cited they provide context. Particulate is interpreted against practical residential IAQ target bands (Excellent / Good / Mildly elevated / Elevated / High).

Sensor tolerances, disagreement, and exclusion. Low-cost optical and electrochemical sensors carry real measurement tolerances and can disagree, particularly on particulates. Where two co-located sensors diverge materially — as they did at the closest vent — we report both values and flag the reading for re-measurement rather than selecting a winner or averaging them. Where a sensor's behavior demonstrates it is not reporting reliably — as the Temtop's CO2 channel did (see §03) — we exclude that channel rather than publish a number we cannot stand behind.

TVOC concentration and VOC Index are different measures. TVOC concentration (ppb) estimates how much volatile organic compound is present and is compared against an external guideline. The VOC Index is a unitless trend signal in which 100 represents the room's own recently learned normal; a rise indicates change relative to that room, not an absolute quantity. The two are not interchangeable and are not convertible to one another.

Comfort vs. air quality. Temperature and humidity are reported as comfort and HVAC-performance observations. They affect how a space feels and how well equipment is performing, but are not themselves indoor-air-quality health measures.

§ 06 Reference Ranges

Metric	Recommended Limit / Range	Authority	Notes
CO	<9 ppm (8-hr); <35 ppm (1-hr)	EPA NAAQS	Colorless and odorless. Health-based exposure limits. CO should normally be absent indoors; any measurable indoor source warrants inspection
PM1	No EPA standard (informational)	—	Sub-micron particles; no regulatory standard exists. Reported for completeness
PM2.5	Residential: <5 excellent, 5–12 good, 12–25 mild, 25–35 elevated, >35 high	Residential IAQ targets	Short spot readings interpreted against residential targets, not the EPA annual standard (9 ug/m3, a long-term outdoor average) or 24-hr standard (35 ug/m3), shown for context
PM10	<150 ug/m3 (24-hr)	EPA NAAQS	Coarse particles; irritate upper airways
CO2	<1,000 ppm (occupied indoor)	ASHRAE 62.1	Ventilation-adequacy indicator, not a toxicity measure. Outdoor baseline varies locally (250–450 ppm typical); sustained indoor readings at or above ~1,000 ppm suggest limited fresh-air exchange
TVOC concentration	<220 ppb	WELL Building Standard	Estimated total volatile organic compound concentration
VOC Index	100 = the room's learned baseline	Sensirion VOC Index	Unitless 1–500 trend signal relative to the room's own recent normal; not a concentration and not convertible to ppb
HCHO (Formaldehyde)	<0.1 mg/m3 (30-min); Health Canada 0.05 (8-hr)	WHO / Health Canada	WHO indoor guideline; stricter residential targets exist. Values approaching 0.1 warrant source investigation
NOx Index	1 = clean baseline	Sensirion NOx Index	Index >50 indicates combustion or chemical sources present
Temperature	68–76 F (summer cooling)	ASHRAE 55	Comfort / HVAC-performance observation, not an air-quality measure
Relative Humidity	30–50%	ASHRAE 55 / 62.1	Comfort / HVAC-performance observation. Below 30%: dry membranes; above 60%: mold risk