

Monitor: 33444
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Health

-  **Particles**
-  **Chemicals**
-  **Carbon Dioxide**

Comfort

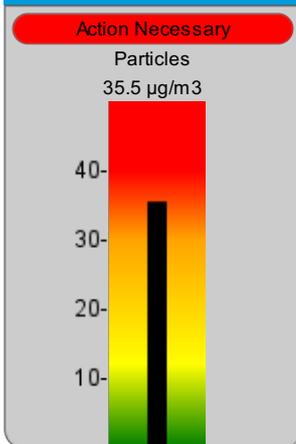
-  **Temperature**
-  **Relative Humidity**

Safety

-  **Carbon Monoxide**

HEALTH

Particles



Health Concerns Particles are generally a cause for concern when daily average levels are above 10 $\mu\text{g}/\text{m}^3$. Particles are known to trigger asthma and allergy symptoms. At levels above 35 $\mu\text{g}/\text{m}^3$, they can harm normally healthy adults by causing emphysema and diminished lung capacity. Children, the elderly, pregnant women and individuals with preexisting lung conditions are more susceptible.^a

What We Found In Your Home Particle levels were above 35 $\mu\text{g}/\text{m}^3$.

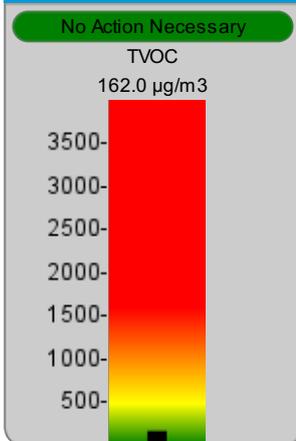
Potential Causes Particles can build up to unhealthy levels due to three primary causes:

- Activities in the home
- Presence of excessive particulate sources
- Heating and cooling system issues

Recommended Actions

- Replace filters or upgrade filtration system
- Upgrade thermostat to operate HVAC system fan on a schedule to more completely filter airborne particles
- Inspect duct work; seal and clean as necessary
- Install UV light in the A/C cooling coil to prevent biological growth
- Use range exhaust fan when cooking

Chemicals



Health Concerns Chemical pollutants are generally a cause for concern when average levels are above 500 $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter of air). Chemical pollutants are known to trigger asthma and allergy symptoms. At moderate levels, eyes and nasal passages can be irritated. Some people can experience nausea and headaches. At very high levels, they can even affect normally healthy adults by overworking the liver and kidneys. Children, the elderly, and pregnant women are more susceptible.^b

What We Found In Your Home Chemical pollutant levels were below 500 $\mu\text{g}/\text{m}^3$.

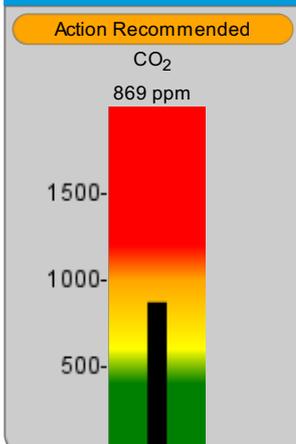
Potential Causes Levels can build up in your home's air due to usage of chemical products and heating/cooling system issues:

- Sources: Off-gassing from building materials, carpeting, furniture and other synthetic materials, fuel fumes, scented products and air fresheners, personal care products, household products such as paint, glue, and plastics
- Possible heating & cooling issues: Lack of fresh air introduced into home (either inadequate mechanical ventilation or none present), no chemical pollutant removal equipment

Recommended Actions

- Minimize use of VOC sources such as air fresheners, open cleaning fluids, or candles
- Use range exhaust fan when cooking

Carbon Dioxide



Health Concerns Carbon dioxide (CO₂) levels above 750 ppm (parts per million) are a cause for concern. At higher levels, CO₂ inside a home can contribute to what the EPA terms "sick building syndrome," which leads to fatigue, headache, breathing difficulties, nausea, strained eyes and itchy skin. CO₂ poisoning, however, is very rare. The U.S. EPA recommends a maximum concentration of CO₂ of 1000 ppm (0.1%) for continuous exposure.^c

What We Found In Your Home Carbon dioxide levels were between 751-999 ppm.

Potential Causes Elevated carbon dioxide levels can occur in the home due to source causes, home heating & cooling system issues, or both:

- Sources: 'Tight' (well weatherized and energy-efficient) home construction without adequate ventilation, common human & household activity (breathing, and burning candles, gas, wood, or other combustion)
- Possible heating & cooling issues: Lack of supplied fresh air (no ventilation), malfunctioning ventilation, ventilation shut off by occupant, HVAC equipment needs repair or service

Recommended Actions

- Install an energy efficient ventilation device, such as a heat or energy recovery ventilator (HRV or ERV)
- Use range exhaust fan when cooking

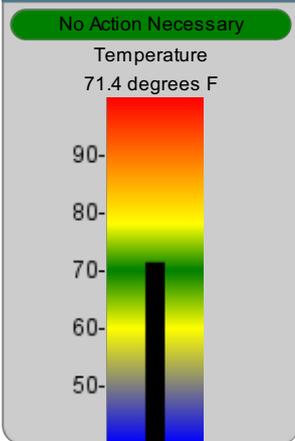
a. Source: American Lung Association, Environmental Protection Agency (EPA); Indoor Air Quality Association.

b. Sources: European Union (EU); Leadership in Energy & Environmental Design (LEED); Environmental Protection Agency (EPA).

c. Source: EPA, Minnesota Dept of Health.

COMFORT

Temperature



Comfort Concerns Comfortable temperatures fall within the range of 68 and 75 degrees F. In addition temperatures are most comfortable when steady, with fluctuations less than 1-1/2 degrees. Ideally, temperature should be constant between all areas of the home. People experience a chilling or 'goose bump' sensation when temperatures are uneven and when air blows quickly across the surface of the skin.^a

What We Found In Your Home The temperature level was inside the normal range.

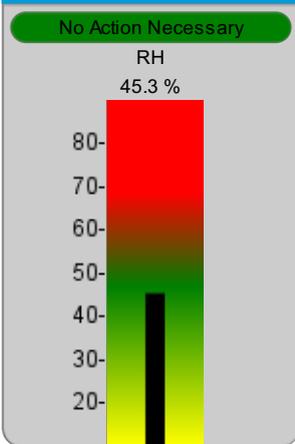
Potential Causes Fluctuating and/or low and high temperatures can occur due to structural causes and/or home heating & cooling system issues:

- Structural causes: Poor insulation, inadequate weatherization (for example, poorly sealed windows and doors create drafts)
- Possible heating and cooling issues: Thermostat poorly located (in an area where air supply falsely influences readings), uneven heating or cooling from room to room due to imbalanced ductwork or inadequate or poorly sized equipment

Recommended Actions

- Upgrade to programmable thermostat for improved accuracy and energy savings

Relative Humidity



Comfort and Health According to the ALA the relative humidity should be near 50% when possible. When air is too dry, people typically feel colder, and respiratory passages can become irritated and prone to infection. Conversely, air that is too moist defeats perspiration, the body's natural cooling mechanism. High moisture also can lead to condensation within walls and on windows, which can cause mold.^b

What We Found In Your Home The relative humidity levels were inside the normal range.

Potential Causes Fluctuating and/or low and high relative humidity can occur due to structural causes and/or home heating & cooling system issues:

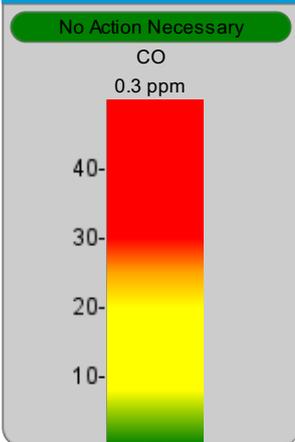
- Structural causes: Standing water in basement or other areas, leaky pipes/faucets, inadequate ventilation in winter (causes moisture build-up inside), and home is under "negative pressure" (pulls dry or moist air in from outside)
- Possible heating & cooling system issues: no or inadequate humidification or ventilation, improperly sized cooling system (prevents dehumidification), HVAC equipment needs repair (condensate drain or coil malfunctioning)

Recommended Actions

- Operate bathroom fans during and after bathing. Install ASHRAE-compliant bathroom fan switch
- Use range exhaust fan when cooking

SAFETY

Carbon Monoxide



Safety Concerns Carbon monoxide replaces oxygen in the blood, and is a cause for concern when average levels are 6 ppm or higher. When levels are above 25 ppm, immediate action should be taken. Carbon monoxide is a colorless, odorless, poisonous gas produced by combustion. When people are exposed to relatively low levels, it can cause headaches and nausea. At relatively high levels it can cause memory problems and ultimately death.^c

What We Found In Your Home Carbon monoxide levels were below 6 ppm.

Potential Causes Elevated carbon monoxide can occur due to source causes, home heating & cooling system issues, or both:

- Sources: Fireplaces, cooking, combustion appliances (water heater, gas dryer, stove), vehicles running in attached garage
- Possible heating & cooling system issues: Cracked heat exchanger on furnace, leaking chimney or vent, inadequate exhausting of a combustion appliance (water heater, gas dryer, stove)

Recommended Actions

- Install or check CO alarm(s) per local code

a. Source: American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

b. Source: American Society of Heating, Refrigeration and Air Conditioning Engineers; Health Canada; Washington Department of Health.

c. Source: US Environmental Protection Agency; World Health Organization (WHO); Indoor Air Quality Association (IAQA).