

Carbon Monoxide Safety

Many people have purchased or are considering the purchase of a Carbon Monoxide detector. Here are some basic facts regarding CO and CO detectors.

What is carbon monoxide (CO) and how is it produced in the home?

- CO is a colorless, odorless, toxic gas. It is produced by the incomplete combustion of solid, liquid and gaseous fuels. Appliances fueled with gas, oil, kerosene, or wood may produce CO. If such appliances are not installed, maintained, and used properly, CO may accumulate to dangerous levels.

What are the symptoms of CO poisoning and why are these symptoms particularly dangerous?

- Breathing CO causes symptoms such as headaches, dizziness, and weakness in healthy people. CO also causes sleepiness, nausea, vomiting, confusion and disorientation. At very high levels, it causes loss of consciousness and death. This is particularly dangerous because CO effects often are not recognized. CO is odorless and some of the symptoms of CO poisoning are similar to the flu or other common illnesses.

CO Prevention

How can production of dangerous levels of CO be prevented?

- Dangerous levels of CO can be prevented by proper appliance maintenance, installation, and use.

Maintenance:

- A qualified service technician should check your home's central and room heating appliances (including water heaters and gas dryers) annually. The technician should look at the electrical and mechanical components of appliances, such as thermostat controls and automatic safety devices.
- Chimneys and flues should be checked for blockages, corrosion, and loose connections.
- Individual appliances should be serviced regularly. Kerosene and gas space heaters (vented and unvented) should be cleaned and inspected to insure proper operation.

Installation:

- Proper installation is critical to the safe operation of combustion appliances. All new appliances have installation instructions that should be followed exactly. Local building codes should be followed as well.
- Vented appliances should be vented properly, according to manufacturers instructions.
- Adequate combustion air should be provided to assure complete combustion.
- All combustion appliances should be installed by professionals.

Appliance Use:

- Follow manufacturer's directions for safe operation.
- Make sure the room where an unvented gas or kerosene space heater is used is well ventilated; doors leading to another room should be open to insure proper ventilation.
- Never use an unvented combustion heater overnight or in a room where you are sleeping.

What are the signs that might indicate improper appliance operation?

- Decreasing hot water supply
- Furnace unable to heat house or runs constantly
- Sooting, especially on appliances
- Unfamiliar or burning odor
- Increased condensation inside windows

What are some visible signs that might indicate a CO problem?

- Improper connections on vents and chimneys
- Visible rust or stains on vents and chimneys
- An appliance that makes unusual sounds or emits an unusual smell
- An appliance that keeps shutting off (Many new appliances have safety components attached that prevent operation if an unsafe condition exists. If an appliance stops operating, it may be because a safety device is preventing a dangerous condition. Therefore, don't try to operate an appliance that keeps shutting off; call a service person instead.)

What are some other ways to prevent CO poisoning?

- Never use a range or oven to heat the living areas of the home
- Never use a charcoal grill or hibachi in the home
- Never keep a car running in an attached garage

CO Detection

Can CO be detected?

- Yes, CO can be detected with CO detectors that meet the requirements of Underwriters Laboratories (UL) standard 2034.
- Since the toxic effect of CO is dependent upon both CO concentration and length of exposure, long-term exposure to a low concentration can produce effects similar to short term exposure to a high concentration.
- Detectors that meet the UL standard measure both high CO concentrations over short periods of time and low CO concentrations over long periods of time. The effects of CO can be cumulative over time.
- Detectors sound an alarm before the level of CO in a person's blood would become crippling.
- Detectors that meet the UL 2034 standard currently cost between \$35 and \$80.

Where should the detector be installed?

- CO gases distribute evenly and fairly quickly throughout the house; therefore, a CO detector should be installed on the wall or ceiling in sleeping area/s but outside individual bedrooms to alert occupants who are sleeping.

Aren't there safety devices already on some appliances? And if so, why is a CO detector needed?

- Vent safety shutoff systems have been required on furnaces and vented heaters since the late 1980's. They protect against blocked or disconnected vents or chimneys.
- Oxygen depletion sensors (ODS) have also been installed on unvented gas space heaters since the 1980's. ODS protect against the production of CO caused by insufficient oxygen for proper combustion.
- These devices (ODS's and vent safety shutoff systems) are not a substitute for regular professional servicing, and many older, potentially CO-producing appliances may not have such devices. Therefore, a CO detector is still important in any home as another line of defense.

Are there other CO detectors that are less expensive?

- There are inexpensive cardboard or plastic detectors that change color and do not sound an alarm and have a limited useful life. They require the occupant to look at the device to determine if CO is present. CO concentrations can build up rapidly while occupants are asleep, and these devices would not sound an alarm to wake them.

Carbon Monoxide Action Levels

Standard for Action Levels

The following action levels have been defined as minimums for BPI certified Carbon Monoxide Analysts. Analysts may work for a government agency or business entity that has adopted more stringent standards than the ones defined in this document. As such, CO Analysts may enforce those higher standards. Under no circumstances shall a BPI certified CO Analyst recognize less stringent standards or ignore conditions in excess of the defined action levels. The action levels are considered net indoor ambient readings - i.e. - indoor ambient minus outdoor ambient readings.

0 to 9 parts per million (ppm)

Normal - No Action: Typical from: outdoor sources, fumes from attached garages, heavy smoking, fireplace spillage and operation of unvented combustion appliances. With ambient conditions in this range, analysts may continue testing sequences.

10 to 35 parts per million (ppm)

Marginal: This level could become problematic in some situations. Actions: Occupants should be advised of a potential health hazard to small children, elderly people and persons suffering from respiratory or heart problems. If the home has an attached garage, document CO levels in garage. Accept this level as normal for unvented appliances but not for vented appliances. If unvented appliances are in operation, recommend additional ventilation in the areas of operation. With ambient conditions in this range, analysts may continue testing to locate the CO source.

36 to 99 parts per million (ppm)

Excessive: Medical Alert. Conditions must be mitigated. Actions: Ask occupants to step outside and query about health symptoms. Advise occupants to seek medical attention. If occupants exhibit any symptoms of CO poisoning, have someone drive them to a medical facility. Enter the building, open doors and windows to ventilate the structure. Turn off all combustion appliances until the CO level has been reduced to safe levels. If forced air equipment is available, continuous operation of the air handler is recommended at this time. If the home has an attached garage, document CO levels in garage. Test combustion appliances one at a time to determine the source of CO production. If an appliance is determined to be the source of CO production, it should be shut off and not used until a qualified technician with proper test equipment can service it.

100 - 200 parts per million (ppm)

Dangerous: Medical Alert. Emergency conditions exist. Actions: Evacuate the building

immediately and check occupants for health symptoms. Advise all occupants to seek medical attention. Occupants should have someone else drive them to a medical facility. If occupants exhibit symptoms of CO poisoning, emergency service personnel must be called. Evacuation is important, but Analysts must not subject themselves to excessive conditions. Maximum exposure time is 15 minutes. Open all doors and windows that can be done quickly. If the home has an attached garage, document CO levels in garage. Disable combustion appliance operation. Continually monitor indoor ambient levels while moving through the building. Once the atmosphere within the structure has returned to safe levels and the appliances have been turned back on, locate the source of CO production for corrective measures.

Greater than 200 parts per million (ppm)

Dangerous: Medical Alert. Emergency conditions exist. Actions: Evacuate the building immediately and check occupants for health symptoms. Advise all occupants to seek medical attention. Occupants should have someone else drive them to medical facility. If occupants exhibit symptoms of CO poisoning, emergency service personnel must be called. Evacuation is important, but analysts must not subject themselves to these conditions. Do not stay inside or re-enter the building until conditions have dropped below 100 ppm. Open all doors and windows that can be done quickly without entering the structure. Call the local utility to shut off gas supply (if applicable and necessary). If the home has an attached garage, document CO levels in garage if possible to do so without being subjected to high levels of CO. Once the atmosphere within the structure has returned to safe levels, restore fuel supply to appliances. Operate and test the appliances one at a time to determine the source of CO production.