Carbon Monoxide

What is carbon monoxide?

Carbon monoxide gas is colorless, tasteless, odorless and non-irritating. It cannot be detected by any of the senses and is particularly hazardous because it replaces the oxygen in the blood, interfering with the normal transport of oxygen to the cells of the body. Because it is not readily detected, employees can be exposed to very high levels without realizing there is a problem. Symptoms include headache, nausea, dizziness, visual disturbance and rapid breathing. A person may feel weak and disoriented, making it difficult to get help. Most people recover completely, but in severe cases, symptoms can persist for many weeks or even months, or there can be permanent brain damage or damage to the heart, or even death. L&I reports "Every fall and winter, we see an increase in these incidents".

Where is CO found?

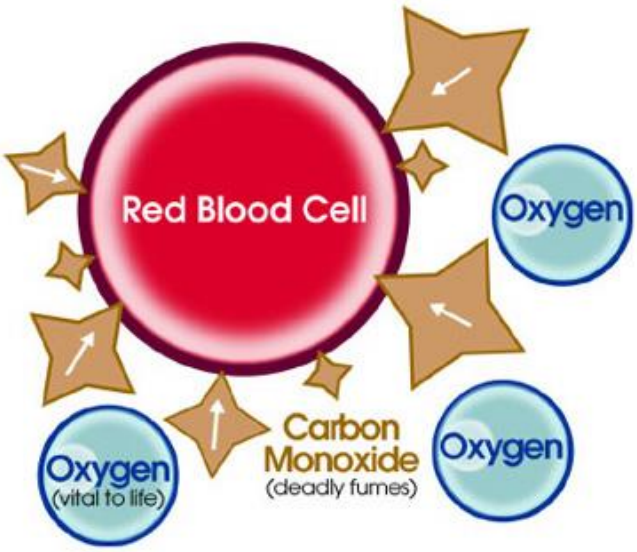
CO is found in combustion fumes, such as those produced by cars and trucks, small gasoline engines (generators, lawn mowers, etc.), stoves, lanterns, burning charcoal and wood, and gas ranges and heating systems. CO from these sources can build up in enclosed or semi-enclosed spaces. People and animals in these spaces can be poisoned by breathing it. Outdoor use of any of this equipment is not usually hazardous.

What are the symptoms of CO poisoning?

The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion. High levels of CO inhalation can cause loss of consciousness and death. Unless suspected, CO poisoning can be difficult to diagnose because the symptoms mimic other illnesses like the flu. People who are sleeping or intoxicated can die from CO poisoning before ever experiencing symptoms.

How does CO poisoning work?

Red blood cells pick up CO quicker than they pick up oxygen. If there is a lot of CO in the air, the body may replace oxygen in blood with CO. This blocks oxygen from getting into the body, which can damage tissues and result in death. CO can also combine with proteins in tissues, destroying the tissues and causing injury and death.



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Who is at risk from CO poisoning?
All people and animals are at risk for CO poisoning. Certain groups — unborn babies, infants, and people with chronic heart disease, anemia, or respiratory problems — are more susceptible to its effects. Each year, more than 400 Americans die from unintentional CO poisoning, more than 20,000 visit the emergency room and more than 4,000 are hospitalized due to CO poisoning. Fatality is highest among Americans 65 and older.

How can I prevent CO poisoning from my home appliances?

- Have your heating system, water heater and any other gas, or oil appliances serviced by a qualified technician every year.
- Do not use portable flameless chemical heaters (catalytic) indoors. Although these heaters don't have a flame, they burn gas and can cause CO to build up inside your home, cabin, or camper.

- When purchasing gas equipment, buy only equipment carrying the seal of a national testing agency, such as the CSA Group.
- Install a battery-operated or battery back-up CO detector in your home and check or replace the battery when you change the time on your clocks each spring and fall. Make sure the detector cannot be covered up by furniture or draperies.

How do I vent my gas appliances properly?

- All gas appliances must be vented so that CO will not build up in your home, cabin, or camper.
- Never burn anything in a stove or fireplace that isn't vented.
- Have your chimney checked or cleaned every year. Chimneys can be blocked by debris. This can cause CO to build up inside your home, cabin or camper.
- Never patch a vent pipe with tape, gum, or something else. This kind of patch can make CO build up in your home, cabin, or camper.
- Horizontal vent pipes to fuel appliances should not be perfectly level. Indoor vent pipes should go up slightly as they go toward outdoors. This helps prevent CO or other gases from leaking if the joints or pipes aren't fitted tightly.

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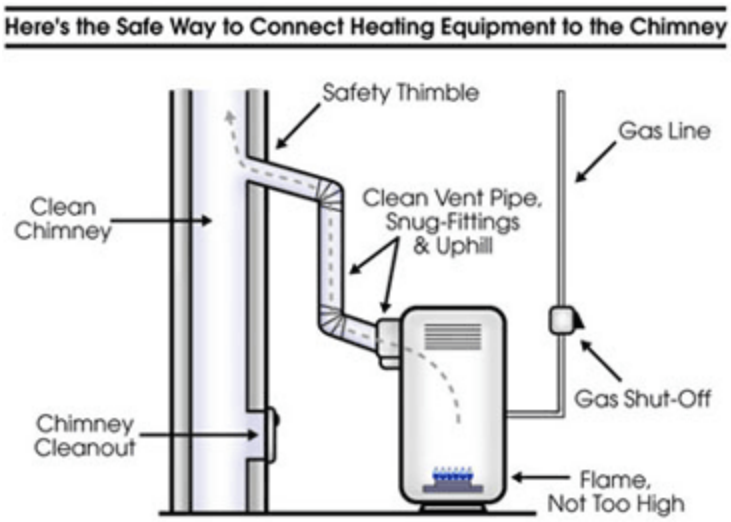

How can I heat my house safely or cook when the power is out?

- Never use a gas range or oven for heating. Using a gas range or oven for heating can cause a buildup of CO inside your home, cabin, or camper.
- Never use a charcoal grill or a barbecue grill indoors. Using a grill indoors will cause a buildup of CO inside your home, cabin, or camper unless you use it inside a vented fireplace. Burning charcoal — red, gray, black, or white — gives off CO.
- Never use a portable gas camp stove indoors. Using a gas camp stove indoors can cause CO to build up inside your home, cabin, or camper.
- Never use a generator inside your home, basement, or garage or near a window, door, or vent. **Put generators outside. Deadly levels of carbon monoxide can quickly build up in these areas and can linger for hours, even after the generator has shut off**.
- Use proper fuel in kerosene space heaters.
- Do not use gasoline-powered tools and engines indoors. Never operate unvented fuel-burning appliances in any room with closed doors or windows or in any room where people are sleeping.

How can I avoid CO poisoning from my vehicle?

- Have a mechanic check the exhaust system of my car every year. A small leak in your car's exhaust system can lead to a buildup of CO inside the car.
- Never run a car or truck in the garage with the garage door shut. CO can build up quickly while your car or truck is running in a closed garage. Never run your car or truck inside a garage that is attached to a house and always open the door to any garage to let in fresh air when running a car or truck inside the garage.
- If you drive a vehicle with a tailgate, when you open the tailgate, you also need to open vents or windows to make sure air is moving through your car. If only the tailgate is open CO from the exhaust will be pulled into the car.

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It doesn't take much CO to cause problems. Below is a table outlining the general effects of carbon monoxide on healthy adults. **Individual susceptibility will vary.**

PPM CO in air	Percent CO in air	Symptoms experienced by healthy adults	Comments
Less than 35 ppm	0.0035%	No effect in healthy adults	35 ppm is WISHA 8-hour average permissible limit
100 ppm	0.01 %	Slight headache, fatigue, shortness of breath, errors in judgment	
200 ppm	0.02%	Headache, fatigue, nausea, dizziness	200 ppm is Short Term Exposure Limit (STEL)
400 ppm	0.04%	Severe headache, fatigue, nausea, dizziness, confusion, can be life-threatening after 3 hours of exposure	
800 ppm	0.08%	Headache, confusion, collapse, death if exposure is prolonged	
1500 ppm	0.15%	Headache, dizziness, nausea, convulsions, collapse, death within 1 hour	Levels greater than 1500 ppm are considered "immediately dangerous to life or health" (IDLH). This is the ceiling limit.
3000 ppm	0.3%	Death within 30 minutes	
6000 ppm	0.6%	Death within 10 – 15 minutes	
12,000 ppm	1.2%	Nearly instant death	

ppm = parts per million

At lower levels, people sometimes mistake the symptoms of CO exposure for the flu, or do not associate their severe headache and nausea with carbon monoxide exposure.
People with heart or lung conditions or other health problems can be more sensitive to the effects of carbon monoxide. In addition the fetus of a pregnant woman can be adversely affected by carbon monoxide she inhales. **For this reason WISHA Permissible limits for carbon monoxide are 35 ppm averaged over 8 hours with a 200 ppm ceiling limit.**

http://wisha-training.lni.wa.gov/Training/InvestigationStories/COpoisoning/player.html