

DANGER: Carbon Monoxide



Carbon monoxide (CO) is a colourless and odourless gas. You cannot depend on your senses to detect its presence.

CO is a product of incomplete combustion of fuels such as gasoline, diesel, and propane. It is found in the exhaust of internal combustion engines from cars, trucks and forklifts. Furnaces and heaters can also produce CO. It is also present when materials such as paper, wood and plastics burn. An open fire in an enclosed area produces CO as well as many other contaminants.

WHERE TO FIND CO:

- Garages and indoor parking lots.
- Warehouses and other closed areas where gasoline, diesel or propane forklifts are used.
- Furnace rooms where improperly adjusted burners are operated.
- Construction sites where improperly adjusted space heaters are used.
- Faulty stacks or chimney downdraft.
- Arenas where gasoline, diesel or propane-powered ice maintenance equipment is used.

HOW DOES CO ENTER THE BODY?

If CO is present in the surrounding atmosphere, a worker will be exposed by breathing the contaminated air. CO then infiltrates the bloodstream through the lungs. The amount of CO inhaled depends on its concentration in the air and the physical activity of the exposed person. The more physically active a person is, the more CO will be inhaled. A person's lifestyle also affects the body's burden of CO. Smokers tend to have higher levels of CO in their blood due to the cigarette smoke they inhale.

HOW DOES CO AFFECT THE HEALTH?

CO is a chemical asphyxiant. Once it reaches the blood, it binds to hemoglobin, preventing oxygen from being effectively carried by the blood. It causes a condition known as hypoxia, characterized by a deficiency of oxygen reaching the body's tissues. The body will try to compensate for this by increasing the cardiac output and the blood flow to specific organs such as the heart and brain. Each vital organ has to work harder to function due to the reduction of oxygen in the blood.

WHAT ARE THE SYMPTOMS OF CO EXPOSURE AT VARIOUS CONCENTRATIONS?

Concentration	Symptoms
Below 25 ppm	Generally no symptoms
25 ppm	New Brunswick Standard
Above 25 ppm	Reduced cardiovascular capacity, neurobehavioural changes
Above 50 ppm	Reduction in vigilance and decrease in motor skills (such as the ability to drive safely)
Up to 200 ppm	Headaches
200-400 ppm	Headaches and nausea after one to two hours
800 ppm	Headaches, nausea, unconsciousness and possible death within two hours
3200 ppm and over	Headaches, nausea, unconsciousness and possible death within 30 minutes

(ppm means "parts per million")

WHAT IS THE EXPOSURE STANDARD IN NEW BRUNSWICK?

The occupational exposure standard is a time-weighted average of 25 ppm for an eight-hour period. WorkSafeNB strongly recommends CO levels be kept below 25 ppm. It is always good practice to avoid unnecessary exposure.

WILL CO ACCUMULATE IN THE BODY AND CAUSE LONG-TERM EFFECTS?

Most effects of a low exposure to CO are short-term in nature, such as headache, nausea and dizziness. CO is not a cumulative poison. Once the exposure stops, CO is eliminated from the body in a matter of hours or days. However, if exposure resumes before the body has had time to eliminate all of the CO it has accumulated, as would be the case with recurrent daily exposures, the body burden will increase as time progresses. A person exposed to such conditions may experience daily poisoning episodes.

HOW CAN I MEASURE CO?

The easiest and least expensive way to measure CO is to use colorimetric samplers. These samplers are widely used in industry. They indicate the concentration of a gas by a change in colour of the detection media. The accuracy is variable and depends on the selected method. Colorimetric sampling devices are portable, easy to use, and are available through safety supply stores.

More sophisticated sampling techniques can also be used, such as industrial-grade electronic samplers. These can either be fixed at a permanent location or used as a personal monitor. They are more accurate, will log for long periods of time and can be linked to an alarm. This type of sampler should be handled or installed by qualified personnel according to manufacturer's instructions.

Residential CO monitors sold at local hardware stores may not be appropriate for industrial or commercial applications, and may not function properly when used in an occupational environment.

HOW CAN I PREVENT CO EXPOSURES?

Good basic maintenance of internal combustion engines or space heaters is important to meet manufacturer's recommendations. Combustion gases should be exhausted outside, wherever possible. The installation of catalytic converters is also a good way to reduce CO emissions. To prevent chimney downdrafts in a building where a fossil fuel burner is used for heating, ensure you have adequate replacement air to serve the appliance or fans that exhaust air outside.

WHAT SHOULD I DO IF I SUSPECT I AM BEING OVEREXPOSED TO CO?

- Immediately notify your supervisor.
- Vent or evacuate areas where people are experiencing symptoms consistent with CO poisoning, such as headache, nausea and dizziness.
- Identify the source of CO and correct the problem right away.
- Seek medical attention for your symptoms. The medical practitioner will decide if testing is necessary to assess your condition and if medical treatment is required.

As required by the *Occupational Health and Safety (OHS) Act* of New Brunswick, when an overexposure to CO occurs at a place of employment, the employer must notify WorkSafeNB immediately [Subsection 43(4)(a) of the *OHS Act*]. A health and safety officer may be assigned to conduct an investigation.

To contact WorkSafeNB, call us toll-free at 1 800 222-9775. You can also get more information at www.worksafenb.ca.