Safety Spotlight

Carbon Monoxide Hazards

What is Carbon Monoxide?[1]

Carbon monoxide (CO) i s a poisonous, colorless, odorless, and tasteless gas that is often mixed with other gases that do have an odor. Due to this, you can inhale CO along with other gases without knowing CO is present.

CO is a common industrial hazard resulting from the incomplete burning of natural gas and any other material containing carbon (i.e. gasoline, kerosene, oil, propane, coal, or wood). Although forges, blast furnaces, and coke ovens produce CO, the most common sources of exposure to it in the workplace is the internal combustion engine.

How does Carbon Monoxide Harm You?[1]

This gas is harmful when it is breathed in because it displaces oxygen in the blood and deprives the heart, brain, and other vital organs of oxygen. Large amounts of CO can overcome workers in minutes without warning – causing them to lose consciousness and suffocate. Besides tightness across the chest, initial symptoms of CO poisoning may include headache, fatigue, dizziness, drowsiness, or nausea. During prolonged or high exposures, symptoms may worsen and include vomiting, confusion, and collapse in addition to loss of consciousness and muscle weakness.

> *Initial symptoms of carbon monoxide poisoning may include* headache, fatigue, dizziness, drowsiness, or nausea.[1]

Table 1.1 *(below)* includes recommended limits as well as health effects and symptoms of CO exposure based on the concentration and duration of exposure:[2]

Effects and Symptoms	CO Concentration (ppm)	Duration of Exposure (hrs)
ACGIH TLV	25	8
OSHA PEL	50	8
NIOSH REL (ceiling limit)	200	N/A
Slight headache, discomfort	200	3
Headache, discomfort	400	2
Headache, discomfort	600	1
Confusion, headache, nausea	1000 – 2000	2
Tendency to stagger	1000 – 2000	1.5
Slight palpitation of the heart	1000 – 2000	0.5
Unconsciousness	2000 – 2500	0.5
Fatal	4000	<1

TLV – The Threshold Limit Value recommended by the American Conference for Industrial Hygienists (ACGIH)
PEL – The Permissible Exposure Limit enforceable by the Occupational Safety and Health Administration (OSHA)
REL (Ceiling Limit) – The ceiling limit recommended by the National Institute of Occupational Safety and Health (NIOSH)

[1] *"OSHA Fact Sheet: Carbon Monoxide Poisoning." OSHA, 2002.*

[2] *Spear, Jerome E. "Carbon Monoxide Exposure from Lift Trucks." J.E. Consulting, LLC, 2006.*

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Safety Spotlight

Carbon Monoxide Hazards

Who is at Risk for Carbon Monoxide Exposure?[1]

Workers may be exposed to harmful levels of CO in any of the following occupations:

- Welder
- Garage mechanic
- Firefighter
- Carbon-black maker
- Organic chemical synthesizer
- Metal oxide reducer
- Longshore worker
- Diesel engine operator
- Forklift operator
- Marine terminal worker
- Toll booth or tunnel attendant
- Customs inspector
- Police officer
- Taxi driver

What Actions Should be Taken if Someone Has Carbon Monoxide Poisoning?[1]

If you suspect someone has CO poisoning, promptly taking the following actions can help save lives:

- Call 911 or another local emergency number for medical attention or assistance.
- Administer 100-percent oxygen using a tight-fitting mask if the victim is breathing.
- Administer cardiopulmonary resuscitation if the victim has stopped breathing.

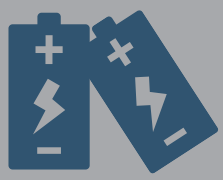
Warning: You may be exposed to fatal levels of CO poisoning in a rescue attempt. Rescuers should be skilled at performing recovery operations and using recovery equipment. Employers should make sure that rescuers are not exposed to dangerous CO levels when performing rescue operations.

How Can Employers Prevent Carbon Monoxide Poisoning?[1]

To reduce the chances of CO poisoning in the workplace, employers should take the following actions:

- Install an effective ventilation system that will remove CO from work areas.
- Maintain equipment and appliances (e.g. water heaters, space heaters, cooking ranges) that can produce CO in good working order to promote their safe operation and to reduce CO formation.
- Consider switching from gasoline-powered equipment to equipment powered by electricity, batteries, or compressed air if it can be used safely.
- Prohibit the use of gasoline-powered engines or tools in poorly ventilated areas.

> "***Consider switching*** from gasoline-powered equipment to equipment powered by electricity, batteries, or compressed air if it can be used safely."[1]



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Safety Spotlight

Carbon Monoxide Hazards

- Install CO monitors and provide personal CO monitors with audible alarms if potential exposure to CO exists.[1]
- Test air regularly in areas where CO may be present, including confined spaces.
- Use a full-facepiece pressure-demand self-contained breathing apparatus (SCBA) certified by the National Institute for Occupational Safety and Health (NIOSH), or a combination full-facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply in areas with high CO concentrations, i.e., those immediately dangerous to life and health atmospheres.
- Use respirators with appropriate canisters for short periods under certain circumstances where CO levels are not exceedingly high.
- Educate workers about the sources and conditions that may result in CO poisoning as well as the symptoms and control of CO exposure.
- Never use generators indoors or in enclosed or partially enclosed spaces such as garages, crawl spaces, and basements. Make sure they have 3-4 feet of clear space on all sides and above them to ensure adequate ventilation.[3]

In addition, if employees are working in confined spaces where the presence of CO is suspected, ensure that workers test for oxygen sufficiency before entering the area.[1]

What Can Employees Do to Prevent Carbon Monoxide Poisoning?[1]

Employees should do the following to reduce their chances of CO poisoning in their workplace:

- Report any situation to your employer that might cause CO to accumulate.
- Be alert to ventilation problems – especially in enclosed areas where gases of burning fuels may be released.
- Promptly report complaints of dizziness, drowsiness, or nausea.
- Avoid overexertion if you suspect CO poisoning and leave the contaminated area.
- Tell your doctor that you may have been exposed to CO if you get sick.
- Avoid the use of gas-powered engines, such as those in powered washers as well as heaters and forklifts, while working in enclosed spaces.

> *Educate workers about the sources and conditions* that may result in carbon monoxide poisoning as well as symptoms and control of carbon monoxide exposure.[1]

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[3] *"Carbon Monoxide Poisoning." Occupational Safety and Health Administration, 18 July 2007, www.osha.gov/Publications/3282-10N-05-English-07-18-2007.html.*