

## Carbon Monoxide: A Factsheet for Workers, Unions and Community-Based Organizations

Carbon monoxide (CO) is produced whenever combustion occurs. The internal combustion engine is the chief source of workplace exposure to carbon monoxide. Buses, locomotives, trucks, cars, forklifts, compressors, and other equipment powered by gasoline, diesel, or other fossil fuels produce carbon monoxide. Carbon monoxide is also produced by furnaces, heating units, and welding operations. Fire-damaged worksites may contain unsafe levels of carbon monoxide.

### What is carbon monoxide?

Carbon monoxide is a colorless, odorless, tasteless, and non-irritating gas that enters the body through inhalation. It is a byproduct of the incomplete burning of gasoline, wood, coal, oil, propane or any other substance that contains carbon. (Carbon *monoxide* should not be confused with carbon *dioxide*, which is the gas people exhale.) Carbon monoxide can accumulate rapidly even in areas that appear to be well ventilated.

### What are the effects of carbon monoxide?

Once inhaled into the lungs, carbon monoxide combines with hemoglobin, the chemical in red blood cells that carries oxygen. CO deprives the body of oxygen by preventing oxygen from being absorbed into the bloodstream. Without

sufficient oxygen in the bloodstream, even if there is adequate oxygen in the air, vital organs will stop functioning.

The dangers of exposure to carbon monoxide depend on:

- The concentration of carbon monoxide in the air
- How long the exposure lasts, and
- How fast a person is breathing, which may be influenced by the work being done.

Symptoms of excess exposure to carbon monoxide include headache, dizziness, drowsiness and nausea. It is important to recognize these early warning signs because as exposure increases, mental confusion, loss of coordination and weakness will reduce a person's ability to escape.

High exposure may lead to convulsion, coma, or death by suffocation. A highly exposed person who recovers may still suffer permanent brain damage or nerve tissue damage.

The concentration of carbon monoxide in air is measured in *parts per million* (ppm). NIOSH (the National Institute for Occupational Safety and Health, a federal research agency) reports that active workers exposed to concentrations of 80 to 100 ppm of carbon monoxide for 1 to 2 hours experience reduced physical abilities.

Workers with pre-existing lung or heart conditions may experience chest pain or irregular heart beat. Exposure at 700 ppm for an hour or more may result in coma or death, according to NIOSH.

### **What is the medical treatment for carbon monoxide exposure?**

Immediate removal to fresh air is essential. Acute CO poisoning can be treated by restoring breathing with artificial respiration or resuscitation equipment. Carbon monoxide poisoning can be serious and may need to be treated by a physician.

### **What are the legal regulations for carbon monoxide exposure?**

The federal Occupational Safety and Health Act applies to workers employed by private companies. OSHA imposes a permissible exposure limit (PEL) for carbon monoxide of 50 ppm averaged over an 8-hour work shift (29 CFR 1910.1000). State plans may apply to workers employed by state or local governments or public authorities. Some state plans also cover private sector workers. State plans may be more protective than federal regulations. For example, the New York State plan imposes a PEL of 35 ppm for workers in the public sector.

NIOSH recommends that the maximum a worker should be exposed to at any time is 200 ppm. The NIOSH IDLH (immediately dangerous to life or health) level for carbon monoxide is 1,200 ppm.

Exposure at this concentration could result in death or irreversible health effects within 30 minutes.

The American Conference of Governmental Industrial Hygienists (ACGIH), a professional organization, has adopted a recommended threshold limit value (TLV) of 25 ppm averaged over an 8-hour work shift.

The U.S. Environmental Protection Agency (EPA) has established an outdoor carbon monoxide standard of 9 ppm for an 8-hour exposure and 25 ppm for a 1-hour exposure. The U.S. Consumer Product Safety Commission (CPSC) recommends that indoor exposure be limited to 15 ppm averaged over 8 hours and 25 ppm for 1 hour.

### **What can be done to reduce carbon monoxide hazards?**

- Substitution

Electric or propane power should be used in place of gasoline for forklift trucks and other small vehicles or equipment inside the workplace.

- Ventilation

A mechanical ventilation system can be an effective means of eliminating carbon monoxide from the work environment. Individual equipment or work operations can be enclosed and/or connected to a local exhaust ventilation system.

- Training

OSHA's Hazard Communication Standard requires employers to train exposed or potentially-exposed workers about the sources, hazards, symptoms and control of carbon monoxide poisoning.

- Maintenance

Fuel-burning devices - engines, stoves, furnaces, heaters, compressors - should be inspected regularly and repaired (or replaced) promptly to ensure the lowest possible carbon monoxide emissions.

- Monitoring

Carbon monoxide cannot be seen, tasted, or detected by smell. Contact with carbon monoxide will not irritate the skin or eyes. Therefore continuous or regular monitoring is essential.

Workers can wear disposable personal monitoring badges or strips that change color when carbon monoxide levels reach the danger level.

Actual carbon monoxide levels can be measured using air monitoring instruments to determine the extent of the hazard. Personal or area monitors with audible alarms should be considered.

- Safe Work Practices

Use of gasoline- or diesel-powered engines or equipment should not be permitted in buildings or in partially enclosed areas unless their exhaust can be directed outside and away from air intakes.

### **What can workers do to prevent carbon monoxide exposure at work?**

- With your co-workers, identify all possible sources of carbon monoxide. Note any concerns about ventilation.
- If you are in a union, enlist the support of your local health and safety committee or union representative. A union can negotiate changes in working conditions and can bring in its own health and safety experts.
- You have a legal right to ask OSHA or PESH for an inspection of your workplace. Check with your union first.

*(Adapted from a fact sheet prepared by NYCOSH for the National Transit Institute)*

***For more information or for assistance, contact your local union or NYCOSH.***