



**ENTERTAINMENT**  
COALITION

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September 15, 1997

## Preventing Carbon Monoxide Poisoning from Small Gasoline-Powered Engines and Tools

**WARNING! Do not use equipment and tools powered by gasoline engines inside buildings or other partially enclosed spaces unless the gasoline engine can be placed outdoors and away from air intakes.**

Hundreds of people performing many different tasks have been poisoned because small gasoline-powered engines and tools produced hazardous concentrations of carbon monoxide (CO) even in relatively open buildings. These poisonings can occur quickly, even in the presence of what many would consider "adequate ventilation" and in areas that many would define as relatively open spaces, such as parking garages.

Measurements were taken of CO concentrations after one CO poisoning incident in a similar exposure situation to estimate how quickly dangerous CO concentrations develop. In one scenario, a 5.5 horsepower, gasoline-powered pressure washer was operated inside an 8,360.cubic-foot, double-car garage. The two double-car garage doors and one window were left open and the vent was unsealed. The results from the simulation indicate that acutely toxic concentrations of CO can be quickly generated within 3 to 5 minutes.

### HEALTH EFFECTS

CO is a lethal poison that is produced when fuels such as gasoline are burned. It is one of many chemicals found in engine exhaust and can rapidly accumulate even in areas that might appear to be well ventilated. Because CO is colorless, tasteless, odorless, and non-irritating; it can overcome the exposed person without warning. It produces weakness and confusion, depriving the person of the ability to seek safety.

CO poisons primarily by tightly binding to hemoglobin in the blood (forming carboxyhemoglobin), replacing oxygen, and reducing the oxygen-carrying capacity of the blood. CO may also poison by binding to tissues and cells of the human body and interfering with their normal function. Recognizing early warning signs of CO poisoning is sometimes difficult because early symptoms of CO exposure (headache, dizziness, and nausea) are nonspecific and may be mistaken for symptoms of other illnesses such as colds, flu, or food poisoning. Confusion and weakness can inhibit a person's ability to escape the hazardous environment. Symptoms of nervous system effects include staggering, confusion, changes in personality, and muscle aches.

### SOURCE OF POISONINGS

In a Colorado Department of Public Health and Environment study, 40% (135) of all work-related CO poisonings reported since 1985 have been related to the use of gasoline-powered equipment. The



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135 poisonings were primarily caused by concrete-cutting saws (28 workers), power trowels (15 workers), high-pressure washers (14 workers), compressors (10 workers), welding equipment (9 workers), and floor buffers (9 workers). Other equipment causing poisonings included jackhammers, pumps, carpet cleaners, and paint sprayers. Information about where the 135 poisoned workers were using gasoline-powered equipment was available in 115 cases; 110 (96%) of these 115 poisonings occurred indoors.

## **RECOMMENDATIONS**

It is not widely known that small gasoline-powered engines and tools present a serious health hazard. They produce high concentrations of carbon monoxide, a poisonous gas that can cause illness, permanent neurological damage, and death. Because it is colorless, odorless, and nonirritating, CO can overcome exposed persons without warning. Often there is little time before they experience symptoms that inhibit their ability to seek safety. Prior use of equipment without incident has sometimes given users a false sense of safety; such users have been poisoned on subsequent occasions. Recommendations for preventing CO poisoning are provided below for employers, equipment users, tool rental agencies, and tool manufacturers.

### **All Employers and Equipment Users Should:**

- NOT allow the use or operation of gasoline-powered engines or tools inside buildings or in partially enclosed areas unless gasoline engines can be located outside and away from air intakes. Use of gasoline-powered tools indoors where CO from the engine can accumulate can be fatal.
- An exception to this rule might be an emergency rescue situation in which other options are not available; such an exception should be made only when equipment operators, assisting personnel, and the victim are provided with supplied-air respirators.
- Learn to recognize the signs and symptoms of CO overexposure: headache, nausea, weakness, dizziness, visual disturbances, changes in personality, and loss of consciousness. Any of these signs and symptoms can occur within minutes after the equipment is turned on.
- Always place the pump and power unit of high-pressure washers outdoors and away from air intakes so that engine exhaust is not drawn indoors where the work is being done. Run only the high-pressure wash line inside.
- Consider the use of tools powered by electricity or compressed air if they are available and can be used safely. For example, electric-powered tools present an electrocution hazard and require specific precautions for safety. If compressed air is used, place the gasoline-powered compressor outdoors away from air intakes so that engine exhaust is not drawn indoors where the work is being done.
- Use personal CO monitors where potential sources of CO exist. These monitors should be equipped with audible alarms to warn workers when CO concentrations are too high.

### **Employers Should Also:**

- ✓ Conduct a workplace survey to identify all potential sources of CO exposure.
- ✓ Educate workers about the sources and conditions that may result in CO poisoning as well as the symptoms and control of CO exposure.
- ✓ Always substitute less hazardous equipment if possible. Use equipment that allows for the placement of gasoline-powered engines outdoors at a safe distance from air entering the building.
- ✓ Monitor employee CO exposure to determine the extent of the hazard.

### **Equipment Users Should Also:**

- Substitute less hazardous equipment whenever possible. Use electric tools or tools with engines that are separate from the tools and can be located outside and away from air intakes.
- Learn to recognize the warning symptoms of CO poisoning.
- If you have any symptoms, immediately turn off equipment and go outdoors or to a place with uncontaminated air.
- Call 911 or another local emergency number for medical attention or assistance if symptoms occur. Do NOT drive a motor vehicle--get someone else to drive you to a health care facility.
- Stay away from the work area until the tool has been deactivated and measured CO concentrations are below accepted guidelines and standards.
- Watch coworkers for the signs of CO toxicity.

### **Tool Rental Agencies Should:**

- \* Place warning labels on gasoline-powered tools. For example:

WARNING--CARBON MONOXIDE PRODUCED DURING USE CAN KILL--DO NOT USE INDOORS OR IN OTHER SHELTERED AREAS.

- \* Tell renters that the tool should NOT be used indoors and explain why.
- \* Recommend safer tools for the intended use if available.
- \* Have portable, audible CO monitors for rent and encourage their use.
- \* Provide renters with educational materials like this information sheet.

### **Tool Manufacturers Should:**

- ◆ Design tools that can be used safely indoors.
- ◆ Provide warning labels for existing and new gasoline-powered equipment. For example:  
  
WARNING--CARBON MONOXIDE PRODUCED DURING USE CAN KILL--DO NOT USE INDOORS OR IN OTHER SHELTERED AREAS.
- ◆ Provide recommendations for equipment maintenance to reduce CO emissions.
- ◆ Recommend the use of portable, audible CO monitors with small gasoline-powered engines.

Special effects operators may be fabricating, renting out, operating or directing and controlling employees that are operating tools or equipment powered by gasoline engines and should be aware of this information and the recommended practices, procedures and conditions for managing this hazard.