

# Carbon monoxide is most common poisoning in workplace

## UNITED STATES ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

According to the Occupational Safety and Health Administration, carbon monoxide is the most common cause of poisoning in the workplace. In the U.S. Army, CO exposure has been ranked No. 7 in the top 50 worksite hazard occurrences. The Centers for Disease Control and Prevention indicates that CO exposure in housing results in many poisonings and deaths each year. Over the years, there have also been a number of CO poisonings reported within the U.S. military.

Carbon monoxide monitors/alarms are an important part of an overall strategy to prevent CO poisoning and deaths.

Carbon monoxide is a colorless, odorless, tasteless and nonirritating gas formed as a by-product in the incomplete combustion of carbonaceous materials in oxygen, when carbon is in excess.

Because of its high inherent toxicity and extensive exposure potential, CO has historically been considered not only the most widespread poison known, but also the most significant toxic gas in the workplace. The OSHA reported that CO is the most common cause of occupational poisoning.

Numerous instances of CO poisoning and death have occurred in housing, for instance when using indoor fuel-burning cooking and heating appliances that are un-vented, inadequately vented, or improperly functioning due to poor

maintenance.

The CDC reported from 1968 through 1998, CO poisoning contributed to an average of 1,091 unintentional deaths and 2,385 suicidal deaths per year in the U.S. In addition, 40,000 emergency room visits are attributed to accidental CO poisoning in the United States.

During the period of Jan. 1, 1993, to Dec. 31, 2005, there were 924 diagnoses and reports of CO poisoning in U.S. Armed Forces servicemembers. An examination of CO poisoning in the U.S. Armed Forces from January 1998 to June 2003 found 541 episodes of CO intoxication. Of these 78, required hospitalizations and 11 were fatal. The number of CO poisoning cases is greatest during the heating season.

As of 2003, there were 316 U.S. Army installations and 9,393 worksites which were identified as having occupational exposures to CO. In 2000, CO exposure in the U.S. Army was ranked No. 7 in the top 50 occupational hazard occurrences.

Indoor fuel-burning cooking and heating appliances which are un-vented, inadequately vented or improperly functioning due to poor maintenance have resulted in numerous instances of CO poisoning and death. Hundreds to thousands of fatal and nonfatal human CO poisoning occurs yearly throughout the U.S. because of improperly functioning or inadequately vented water heaters, furnaces and kerosene heaters. CO poisoning has also resulted from the use of charcoal indoors for heating or

cooking fuel. Use of gas stoves and ovens as space heaters during the wintertime has resulted in CO poisoning, as well.

Occupational exposures to CO can occur in mines – particularly after blasting or fires, petroleum refineries – near catalytic cracking units, pulp mills – near lime kilns and kraft recovery furnaces and boiler rooms or wherever internal-combustion engines are used or repaired. In metallurgy, CO is used to reduce the oxygen content of iron and other metals. In the steel industry, producer gas and blast-furnace effluent can contain 25 to 30 percent CO. In the chemical industry, CO is used as a feedstock for the synthesis of acrylates, aldehydes, ethylene, isocyanates, methanol and phosgene.

Operation of internal combustion engines in an enclosed area without adequate ventilation is an important source of exposure to CO. Exposure to CO containing exhaust gases can occur to anyone who is working with or near a piece of equipment or vehicle that has an internal combustion engine. Occupations involving exposure include military vehicle crewmembers, policeman, passenger car- taxi, ambulance, bus and truck drivers. Mechanics in military motor pools, toll takers, garage attendants and installation security guards encounter CO exposures. Vehicular exhaust is sometimes entrained through improperly placed building supply air intakes. The indoor use of propane-powered forklifts is a source of CO exposure. Use of pickup-

trucks, campers and camper shells, as passenger compartments, has been linked with serious CO intoxication, particularly among children. Vehicles left running in garages attached to houses have resulted in CO poisoning and death of residents while sleeping in their homes.

Carbon monoxide monitoring requirements for industrial worksites differ from those in family housing. It is important to check with your installation occupational health and safety professional as to what type of monitor or alarm is appropriate for the particular situation.

The U.S. Army requires industrial worksites produce CO such as warehouses with propane-fueled fork-lifts and other similar sites must be monitored to ensure personal exposures do not exceed occupational exposure limits, the more stringent of the American Conference of Governmental Industrial Hygienists, Threshold Limit Value or OSHA Permissible Exposure Limit. Residential CO monitors/alarms that are UL2034 listed are not appropriate for comparison to the ACGIH TLV-TWA in industrial worksites. For instance, unless the person is sedentary, residential CO monitors or alarms that are UL2034 listed will alarm at levels higher than equivalent to the ACGIH TLV-Time-Weighted Average and Biological Exposure Indices, the goal of which is to maintain carboxyhemoglobin blood levels to 3.5 percent or less.