Carbon Monoxide Safety & Compliance Game Plan

The 6 things to do to protect workers from carbon monoxide poisoning.

On average, 356 people die of carbon monoxide (CO) poisoning in Canada each year. Many of these tragedies occur in the workplace. One of the victims was a maintenance worker using a power washer to clean an underground parking garage in Toronto. Unaware that the air around him was becoming toxic, the worker collapsed and was pronounced dead at the hospital. The employer that left the victim exposed to CO gas was fined $75,000 for an OHS violation. The case took place in 2014. If it happened today, the fine would have probably been much higher.

Don’t let this happen to you or your workers. Here’s a game plan for protecting workers against CO poisoning hazards and ensuring compliance with OHS regulatory requirements governing CO exposure.

What’s the Hazard

CO is a poisonous gas that you can’t see, smell or taste. These qualities enable CO to sneak up and strangle victims like the Toronto garage maintenance worker. Breathing in CO displaces oxygen from your blood. And without oxygen, the heart, brain and other vital organs shut down. At first, you may experience headache, fatigue, dizziness, drowsiness or

nausea. If the concentration or length of exposure is high, your symptoms will worsen to include vomiting, confusion, muscle weakness, loss of consciousness or collapse. By the time you get treatment, it may be too late to save you from reproductive damage, brain damage or death.

Who's At Risk of CO Poisoning'

CO gas is produced by the incomplete burning of substances that contain carbon, such as kerosene, oil, natural gas, gasoline, propane, coal or wood. Many workplaces contain equipment that emits CO, including blast furnaces, coke ovens, forges, space heaters.

and especially internal combustion engines. Exposure can occur in boiler rooms, warehouses, petroleum refineries, pulp and paper mills and steel plants. Workers at high risk of CO poisoning include:

- Dock and marine terminal workers;
- Welders;
- Garage mechanics;
- Forklift operators;
- Firefighters;
- Toll booth or tunnel attendants;
- Police officers; and
- Taxi drivers.

Of course, CO poisoning can also happen at home, especially during the cold winter months. Use of space heaters may increase the hazard if you're not careful.

How to Protect Workers from Deadly CO Exposure

OHS regulations and building codes of many jurisdictions require property owners to guard against CO poisoning hazards.

There are 6 basic measures required:

Step 1. Perform CO Hazard Assessment

The starting point is to identify all work equipment and operations that emit CO and determine the level of emissions and degree of worker exposure. The OHS laws of each jurisdiction specify a permissible exposure level (PEL) for CO'in most cases, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) Time-Weighted Average (TWA) of 25 parts per million (ppm). Some jurisdictions also incorporate the ACGIH dilution rates for fuel burning vehicles, based on average operating conditions, measured in actual cubic feet per metre (acfm):

- 10,000 acfm for a propane fueled lift truck;
- 16,000 acfm for a gasoline fueled lift truck;
- 10,000 acfm for an operating automobile;
- 20,000 acfm (or more) for an operating truck;
- 100 acfm/horsepower for a diesel fueled vehicle.

Step 2. Implement Engineering Controls to Limit CO Exposure Levels

As with most hazards, the first and preferred line of defence against CO poisoning is to implement practicable engineering controls to minimize workers' exposure. Engineering controls for limiting CO exposure via mechanical means would potentially include:

- Installation of properly designed mechanical general or local ventilation systems;
- Providing replacement air to replace air exhausted, in accordance with certain requirements.
- Enclosing or areas or work processes that generate CO; and
- Substituting electrical or air-powered equipment for vehicles or equipment run or gasoline, propane or other

CO-emitting fuel.

Building codes also require the installation, maintenance and inspection of CO detectors that will sound the alarm if emissions become unexpectedly dangerous.

Step 3. Implement CO Work/Administrative Controls

The next layer of protection is implementing measures for reducing CO exposure hazards by controlling how the work is carried out, which would include:

- Safe work procedures for carrying out operations or working on or near equipment or machines that emit CO gases;
- Use of personal or area CO monitoring equipment in areas where potentially hazardous CO emissions may occur;
- Regular inspection, maintenance and servicing of internal combustion engines and other sources of CO emissions;
- Posting 'No Smoking' and warning signs in hazardous areas;
- Use of non-sparking tools and equipment in areas potentially containing CO or other flammable or combustible materials;
- Banning the use of gasoline-powered engines or tools in poorly ventilated areas;
- Procedures for responding to leaks and other CO emergencies.

Step 4. Provide & Ensure Proper Use of PPE

PPE is the protection of last resort to use when it's impracticable to use engineering or work controls to eliminate exposing workers to hazardous levels of CO. Respiratory

protection might include 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 that are immediately dangerous to life and health (IDLH) atmospheres. Use respirators with appropriate canisters, in conjunction with personal CO monitoring, for short periods under certain circumstances where CO levels are not exceedingly high.

Step 5. Ensure Workers Are Properly Trained on CO Hazards

Before exposing workers to CO hazards, ensure they're properly trained in:

- The potential sources of CO exposure;
- Why exposure to CO is hazardous;
- How to recognize the signs and symptoms of CO poisoning;
- How to use required respiratory protection, CO monitors and other safety equipment;
- The other measures they can take to protect themselves from CO poisoning;
- How to carry out the necessary safe work procedures; and
- What to do in a CO-related emergency.

Ensure that workers not only receive but also understand their CO safety training and are capable of applying it in actual work conditions.

Step 6. Make Necessary CO First Aid Arrangements

One of the only good things about CO poisoning is that it can be reversed if you act quickly enough. In addition to educating workers on its signs and symptoms, ensure that

there’s a first aid attendant readily available with proper training on administering cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). There also be a reliable means for immediately summoning EMS or other emergency responder and transferring victims to the nearest hospital or medical facility for treatment.