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[Home](#) » Commercial carpet cleaning: Safety first!

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Commercial carpet cleaning: Safety first!

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Following a fatal workplace incident, the Washington State Fatality Assessment and Control Evaluation (FACE) Program issues recommendations for protecting commercial carpet cleaners.

In April 2006, a 35-year-old foreign born Hispanic male died from carbon monoxide (CO) poisoning while cleaning office carpet in a warehouse in Washington State.

The victim, who was working alone, had driven his van inside the empty warehouse and parked near the offices he was assigned to clean. He ran his truck-mounted gasoline-powered carpet cleaner for several hours until he succumbed to the CO generated by the carpet cleaner.

To prevent similar occurrences, the Washington State FACE Program published the following recommendations for businesses engaged in commercial carpet cleaning:

- Do not use gasoline or other fuel-powered engines, equipment, or tools inside buildings or areas where carbon monoxide can build up.
- Work with manufacturers to re-design the truckmounted carpet cleaner so that the unit more effectively reduces or eliminates carbon monoxide in the exhaust gases or prohibits exhausting into the van and work areas.
- Ensure carbon monoxide detectors with alarms are used when employees work with fuel- powered engines in environments where CO is likely to build up.
- Use a "Risk Assessment" or "Job Hazard Analysis" tool to identify potential carbon monoxide sources and exposures and how to avoid them.
- Educate workers regarding hazards, sources, symptoms and control of CO exposure.
- Ensure that employees work in pairs on new or unfamiliar jobs and that a continuous communication plan is in effect.

1. Do not use gasoline or other fuel-powered engines, equipment, or tools inside buildings or areas where carbon monoxide can build up.

The FACE program recommends that companies park similar truckmounted carpet cleaning units outdoors with no exceptions. Workers should strategically park their vehicles outside in a manner that would prevent CO from entering the building through doors, windows, or air intake vents. Opening windows and doors may not provide adequate ventilation to make a work safe indoor environment. When work must be done inside buildings, warehouse locations, or other semi-enclosed areas it is recommended that one use equipment with engines powered by electricity or compressed air. Workers should never be in the van when the fuel-powered truck-mounted carpet cleaning unit is operating and exhausting into the immediate environment.

2. Work with manufacturers to re-design the truckmounted carpet cleaner so that the unit more effectively reduces or eliminates CO in the exhaust gases or prohibits exhausting into the van and work area.

Employers should work with manufacturers to re-design and engineer carpet cleaning and other internal combustion engine equipment with safer emission controls. An effective control device would be a real time exhaust gas CO sensor capable of shutting the engine off at specific CO levels. Oxygen (O₂) sensors can also monitor exhaust gas, while catalytic converters are effective emission control devices. Truck-mounted cleaning systems should also be designed and maintained to prevent exhaust gases from entering the vehicle and work environment by diverting exhaust gases. Leak proof exhaust hoses can be used to accomplish this.

3. Ensure CO detectors with alarms are used when employees work with fuel-powered engines in environments where CO is likely to build up.

Personal CO monitors should be used whenever a fuel-powered generator is used as an energy source and there is potential for CO to accumulate. Personal CO monitors should provide a means of direct reading of CO exposure concentrations with preset alarm warnings for hazardous concentrations (see Photo) and should have both visual and audible alarm and warning functions. Fixed site ambient CO monitors should also be used near the CO source. CO monitors should be capable of recording and responding to peak CO concentrations and average CO exposures over time WA FACE recommends that CO monitors be set to activate the alarm or warning at an exposure concentration of 35 parts per million (.0035%) which is the level generally accepted to have no adverse health effects in healthy humans. Any CO alarm or warning should initiate evacuation.

4. Use a "Risk Assessment" or "Job Hazard Analysis" tool to identify potential CO sources and exposure and how to avoid them.

CO gas is a colorless, odorless, chemical asphyxiant. Therefore, it is crucial that a thorough risk assessment or job hazard analysis be carried out by an employer to identify possible sources of CO which can be hazardous to exposed workers.

A risk assessment or job hazard analysis for CO exposure should include these steps:

1. Identify all potentially exposed individuals and groups.
2. Identify the processes, tasks, and areas where hazardous exposures could occur.
3. Analyze the potential health risks of the hazardous exposures (e.g., compare against occupational exposure limits).
4. Estimate probability and severity of potential exposure.
5. Assess, measure, and verify the exposures if prompted by #4.
6. Identify hierarchy of control measures from engineering to PPE.
7. Analyze the effectiveness of existing control measures.
8. Determine if new or additional control measures are needed.
9. Set priorities for action.
10. Develop, implement, and monitor a risk control action plan or review existing risk control action plan.

11. Maintain accurate and systematic records or amend existing risk control action plan and use alternative and/or additional control measures.
12. Review and amend at regular intervals or earlier if changes to processes or new developments are proposed.

Employers should conduct follow up assessments in the field to ensure workers both understand and know how to apply the training and instruction at the work site.

5. Educate workers regarding hazards, sources, symptoms, and control of CO exposures.

Employers should use the results of the risk and job hazard assessment to educate their employees regarding CO and how to prevent exposures while doing their job. Employers should contact the equipment manufacturer for safety guidelines and operating procedures. This information should be used to provide employees with equipment specific safety instruction.

6. Ensure that employees work in pairs on new or unfamiliar jobs and that a continuous communication plan is in effect.

Employers should evaluate the potential hazards faced by solitary workers and assess the risks to them and should ensure that measures are in place to control or avoid such risks. These measures should include employees working in pairs, especially when dispatched to new or unfamiliar job sites or remote locations where safety may be a concern. Employees should be trained to continuously monitor the status of their co-workers and how to respond in an emergency. In addition to working in pairs, employers should develop plans for maintaining continuous communication between employees and with their supervisors or dispatchers. The communication plan should have redundancies where possible to deal with equipment issues and guidelines that are strictly followed when there are breaks in communication. In this incident, there was a disruption in communication between the manager and employee which may have been caused by faulty communication equipment or the status of the employee. The break in communication should have prompted the employer to respond or send emergency response to the scene. Situations where an employee is unresponsive and may have been incapacitated by a toxic exposure should be approached with extreme caution by trained emergency responders. Numerous multiple fatality incidents have resulted from responders or rescuers attempting to aid another employee in a toxic environment without first monitoring and remediating the environment to ensure safe entry.

This article was developed by the [Washington State Fatality Assessment and Control Evaluation \(FACE\) Program](#). The FACE Program is supported in part by a grant from the [National Institute for Occupational Safety and Health \(NIOSH\)](#). For more information, contact the [Safety and Health Assessment and Research for Prevention \(SHARP\) Program](#) at 888/667-4277. The full report can be accessed at: <http://www.lni.wa.gov/Safety/Research/Face/ReptNarr/Investigations/Default.asp>

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