A technical reference bulletin by the Risk Control Services Department of the Glatfelter Insurance Group

GLATFELTER PUBLIC PRACTICE SM
A Division of Glatfelter Insurance Group

RISK COMMUNIQUÉ

Floor Buffers in Schools and Carbon Monoxide Hazards

The use of propane powered floor buffers by custodial staff in schools presents the potential for a build-up of carbon monoxide. Fatalities have been reported in custodial and janitorial staff who were operating propane powered floor buffers indoors [1,2]. A middle school called on firefighters to respond to gas odors, which were associated with propane floor buffers that were used inside the school[3]. It is important to recognize the potential dangers when using floor buffers regularly throughout classrooms and hallways because the operating equipment may present a possible carbon monoxide exposure that could be harmful to employees, students and the public that use school facilities.

The Health Hazard

The odors and irritating properties of unburned fuel can frequently cause employees to become aware of a potential carbon monoxide exposure. It is difficult for an individual to detect "clean" smelling exhaust (CO) since it is odorless, tasteless, colorless and non-irritating. Carbon monoxide inhibits oxygen uptake by the blood, which limits the oxygen supply to the brain. The health effects and associated airborne concentrations are described below.

Effects and Symptoms[5]	CO Concentration (ppm)	Duration of Exposure (Hours)
Slight headache, discomfort	200	3
Headache, discomfort	400	2
Headache, discomfort	600	1
Confusion, headache, nausea	1000 – 2000	2
Tendency to stagger	1000 – 2000	1.5
Slight palpitation of the heart	1000 – 2000	0.5
Unconsciousness	2000 – 2500	0.5
Fatal	4000	<1
ACGIH TLV	25	8
OSHA PEL	50	8
NIOSH REL (ceiling limit)	200	N/A

ppm – parts per million
ceiling limit –exposure that shall not be exceeded during any part of the workday
TLV – The Threshold Limit Value recommended by the American Conference for Governmental Industrial Hygienists (ACGIH).
PEL – The Permissible Exposure Limit enforceable by the Occupational Safety and Health Administration (OSHA).
REL (Ceiling Limit) – The ceiling limit recommended by the National Institute of Occupational Safety and Health (NIOSH).
(Spear, 2006)

A technical reference bulletin by the Risk Control Services Department of the Glatfelter Insurance Group

GLATFELTER PUBLIC PRACTICE SM
A Division of Glatfelter Insurance Group

RISK COMMUNIQUÉ

Propane Powered Floor Buffer Use in Schools

Years ago, schools may have purchased propane powered floor buffers and some still use this equipment inside to maintain hallways and classrooms. Floor buffing can typically be a multi-day, full shift project that is done by custodial staff working alone at night when the school is empty. The small air volume inside a classroom coupled with limited ventilation could increase the potential for CO levels to increase, quickly resulting in an exposure to the custodian and other staff who may enter the room.

The older propane floor buffers were not typically equipped with catalytic converters and can generate substantial concentrations of CO. Newly manufactured propane powered buffers often come equipped with catalytic converters and some have emission monitoring shut down systems and come with health warnings. Some floor buffer manufacturers have stopped offering propane powered floor buffers and now only sell electric buffers.

Options to Control CO Emissions

To help reduce the potential for CO exposure from propane powered floor buffers consider the following when practical:

- Replace all propane powered floor buffers with electric units. This could help reduce the CO exposure.
- Replace older propane powered floor buffers with new propane units that include
  - Catalytic converters on the exhaust to lower CO emissions
  - CO and emissions monitoring alarms tied to automatic shut off of the equipment
  - Regular tune-ups and maintenance in accordance with the manufacturer's instructions
- During buffing with propane powered floor buffers, the school heating, ventilation and air-conditioning systems should be turned on with 100 percent outside air provided to the work area with a provision to exhaust the room air to assure adequate air changes to control the concentration of CO within the work area.
- Custodial and janitorial staff working as a team so they can monitor changing conditions and alert others in the event of an emergency.
- Educate employees in the signs and symptoms of exposure and the means to help prevent exposure to carbon monoxide.

Emissions from propane powered floor buffers operated inside schools may generate high concentrations of carbon monoxide and pose a potential health hazard to school employees, students and the general public using the building. Evaluate the activities and equipment associated with floor buffing in order to identify the hazards and make changes in equipment, activities and procedures to help control the potential for a build-up of carbon monoxide inside schools.

References:

1. *National Institure for Occupational Safety and Health, Centers for Disease Control, "Fatality Assessment and Control Evaluation; Janitor Using Propane Buffer Killed by Carbon Monoxide;* http://www.cdc.gov/niosh/face/stateface/or/04or037.html
2. *Federal Court, Wrongful death suit alleges floor buffer caused carbon monoxide death,* http://www.setexasrecord.com/news/200298-wrongful-death-suit-alleges-floor-buffer-caused-carbon-monoxide-death#
3. *WBTV.com, "Strong odor of gas at school came from floor buffer machine, http://www.wbtv.com/global/story.asp?s=1247409,6/10/2010*
4. Spear, J. E. (2006). *Carbon Monoxide Exposure from Lift Trucks*. Retrieved December 1, 2011, from J.E. Spear Consulting, LP: http://jespear.com/articles/06-02-co-lifttrucks.pdf