Worker Safety

Whitepaper: Breathe Easier

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Remove Danger From Gas Emissions With Battery-Powered Solutions

No one who is killed or injured by carbon monoxide on a jobsite sees it coming. Literally, no one. Carbon monoxide cannot be seen, or smelled, or tasted.

Sneaky carbon monoxide (CO) displaces oxygen in the blood and hides in the symptoms of other illnesses. CO poisoning can be disguised as the onset of flu, COVID-19, or food poisoning. According to OSHA.gov information, time and level of exposure are critical. The Occupational Safety and Health Administration (OSHA) permissible exposure limit for CO is 50 parts per million (PPM), prohibiting worker exposure to more than 50 parts of CO gas per million parts of air averaged during an 8-hour period.

After 1 – 2 hours of exposure at 400 PPM, the body may feel waves of nausea, weakness, and vomiting *(see chart)*.[1] Crushing chest pain and tightness may point mistakenly to a heart attack. Confusion and dizziness slow reactions and cloud judgment of how best to flee. Because the body can no longer carry a full supply of oxygen to the body's tissues and vital organs, the nervous system, brain, heart, and lungs are deprived.

EFFECTS OF CO EXPOSURE LEVELS, DURATION, CO EXPOSURE LIMITS		
PPM	DURATION	CO EFFECTS AND EXPOSURE
0 – 4 ppm	8 hrs.	Considered "Good" Air quality
35 ppm	8 hrs.	Recommended 8 hrs. max workplace exposure.
50 ppm	8 hrs.	Recommended 8 hrs. max workplace exposure.
400 ppm	1.3 hrs.	Healthy adults will suffer headaches, dizziness, and nausea in 1-2 hrs. Life threatening after 3 hrs.
800 ppm	< 2 hrs.	Healthy adults will suffer headaches, dizziness, and nausea in 45 min. Unconsciousness/death in less than 2 hrs.
3000 ppm	< 30 Min.	Death in less than 30 minutes

CO, often called "the silent killer," hits fast. At 800 PPM, healthy adults will feel the effects in 45 minutes, with unconsciousness and death in less than 2 hours. The risk also can add up over a long period; breathing low levels of carbon monoxide can cause severe heart problems and brain damage.

Ironically, healthy skilled trades workers with a strong work ethic – the top performers on a crew – may not realize their exposure at first. Symptoms can vary widely from person to person. CO poisoning may occur sooner in those most susceptible: young children, the elderly, people with lung or heart disease, people at high altitudes, or those who already have elevated CO blood levels, such as smokers.[2]

In a work culture that values endurance, a CO gas headache may be viewed as a mere nuisance to "shake off." Those who have the most stamina and the gut instinct to keep working may breathe in carbon monoxide the longest. By the time the strongest humans feel the effects, they may be already compromised.

Urgent safety needs

Workers in the trades are the day-in and day-out backbone of national infrastructure, a company's most important asset, and a resource to be protected. However, overall fatalities in the private construction industry increased 5 percent to 1,061 in 2019 – the largest total since 2007.[5]

To reverse this trend, safety on sites needs to be improved across the board. This need will increase as construction trades continue adding nearly 800,000 jobs from 2014 to 2024.[6] Skilled trade workers will be in demand; keeping experienced workers safely on the job longer will help fill positions. Less experienced workers joining the trades will need extra safety support.

While guidance from OSHA has emphasized prevention, deaths from CO continue.

According to federal mortality data, from 2010 to 2015, a total of 2,244 deaths in the U.S. resulted from unintentional CO poisoning, 393 in 2015 alone.[7] Of course, death rates don't reflect those hospitalized, treated at emergency rooms, or those unreported or misdiagnosed.

Battery-powered equipment is the innovation, and actual lifesaver, that's needed to remove the hazard of emissions from enclosed areas and confined spaces on jobsites. Conveniently, battery-powered solutions also provide greater safety and productivity for an all-around better experience for crews.

A 2013 study specific to work-related CO poisoning from the indoor use of fuel-powered equipment found that workplace exposure to carbon monoxide killed 727 workers in the U.S. between 1992 and 2008. The study called CO the leading cause of acute fatalities from an inhaled substance among U.S. workers.[8]

Realistically, the work settings for enclosed areas and confined spaces can't be eliminated. They're common locations including tunnels, crawl spaces, basements, cramped retail spaces, and plastic sheeting "shells" constructed on a worksite. It important to note that should an enclosed or confined space contain concentrated flammable or explosive gases or dust, it may be considered a hazardous location, meaning only light equipment that has been found suitable for use in that environment can be used.

To properly trained construction workers, a confined space meets a very specific definition. It means a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work;
- Has limited or restricted means for entry and exit; and
- Is not designed for continuous employee occupancy.[9]

However, there are an infinite number of enclosed work areas throughout the construction industry that don't meet the definition of a confined space, but are enclosed, poorly ventilated, and would be deadly with a high enough concentration of CO emissions.

Tragic and unnecessary fatalities continue:

▪ **A worker died using a gas-powered, walk-behind concrete saw in a confined space.** The 34-year-old was cutting through concrete floor to dig new plumbing trenches for a new nail salon in a strip mall. The worker – who was the father of a 1-day-old child – grabbed a quick lunch at a submarine sandwich place, then planned to finish up in just one hour. However, at the windowless, unventilated jobsite, he didn't open the door or run a fan while he worked with the gas saw. Later, a state investigation report stated: "In this incident, the use of a fuel-powered concrete saw indoors was the primary cause of the fatality." [3]

▪ **Nine construction workers in an urban setting were hospitalized after being exposed to carbon monoxide.** Fire Department officials said gas-powered generators had been running in a small, confined space on the job site. Two workers had to be lifted, using ropes, in a high-angle rescue. Readings of CO at the jobsite exceeded 700 parts per million.[4]

Also, collateral damage exists. Trained Emergency Responders and bystanders attempting rescues face the CO danger, too. Jobsite deaths and rescues can cause occupational trauma. Incidents can shake workers' trust in their own personal safety and in their employer.

What can bring improved safety? The answer: Change how work is done in confined spaces.

Past generations of construction workers labored without the latest safety choices, but today's crews have a new mindset and expectations. They realize traditional risks, including inhaling gas fumes, are no longer acceptable on a jobsite.

In one example, Koetter Construction, tried MX FUEL™ battery-powered Cut-Off Saws in the field for several months. Koetter is one of the largest full-service, design-build general contractors and commercial developers in Southern Indiana and Greater Louisville, Kentucky. As a result of the field trial, Koetter crews realized the benefits of eliminating gas-powered equipment and its maintenance. "You don't know what you don't know," Hardscape Manager Nick Moses said. "We accepted the problems but now we realize we don't have to."

It's time to use new and safer ways of working that redefine light equipment. Battery-powered light equipment harnesses high-performing power, eliminates gas emissions in confined spaces, and offers user-driven solutions that supply safety, productivity, and ease of use.

Choices for Today

Everyone agrees – workers need to return home from job sites just as healthy as when they came to work that day.

Battery-powered solutions are ready now to protect workers in enclosed areas and confined spaces by removing gas from the equation.

Saving precious time, battery-powered light equipment eliminates the need to haul 5-gallon gas cans to worksites and maintain gas engines. The push-button start lets workers begin a job without priming a cold gas engine or fighting a pull-cord. And, with no emissions, crews don't have to stop and prep a work area first to provide ventilation, adding productivity. A bonus: Fuel and maintenance costs are gone.

Two game-changing options for work in confined spaces or enclosed areas:

- **The MX FUEL™ 14" Cut-Off Saw.** With zero gas emissions, it's the right tool for crews that need to work in enclosed or confined spaces like basements and crawl spaces. While it's not a complete replacement for a gas saw, it's the right light equipment for high-performance targeted uses and can cut 6 feet of concrete or 72 cuts in #5 rebar per charge.
- The **MX FUEL™ CARRY-ON™ 3600W/1800W Power Supply.** Imagine safe, efficient power for 1 to 2 users with no gas headaches. The power supply can be used both outdoors and indoors, allowing the user to safely operate wherever power is needed.

Other benefits: Battery power brings quieter operation in enclosed areas and confined spaces. In addition to sparing workers' hearing, this means crews can work during the day without disturbing nearby populations. Also, minimal noise allows better communication between crew members. Plus, eliminating gas engines means reduced vibration and less wear on workers' bodies.

*For a downloadable PDF of this whitepaper, click **here**.*

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