Bureau of Safety and Environmental Enforcement

SAFETY ALERT

Safety Alert No. 473

Nov. 14, 2023

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Risk of Exposure to Elevated Carbon Monoxide Found in Offshore Environments

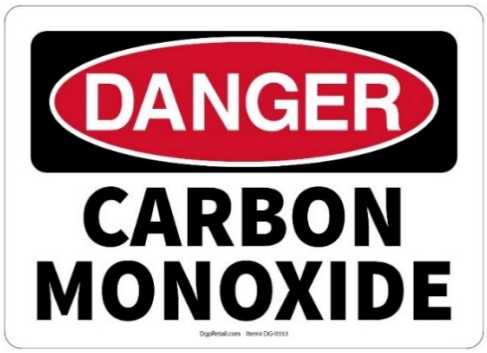

Figure 1: A carbon monoxide warning sign.

Figure 2: Symptoms of carbon monoxide sickness.

Recent inspections conducted by the Bureau of Safety and Environmental Enforcement (BSEE) found concerning carbon monoxide (CO) exposure risks associated with gas-powered machinery on offshore facilities. These risks are notably prevalent during calm weather conditions with light winds, enabling CO to ascend from lower decks. There is a potential for CO to accumulate in isolated areas, corridors, and even enter environmental control intakes, putting personnel at risk of critical CO exposure.

Several inspections conducted during calm weather events revealed alarmingly elevated CO levels within living quarters, control rooms, galley areas, and other spaces across various offshore facilities. Exposure to high levels of CO can lead to symptoms mirroring those illustrated in the image above, with severe exposure cases having the potential to be fatal.

Some of the commonly used stationary CO gas detection devices on offshore facilities have alarm thresholds set at a minimum of 70 parts-per-million (ppm)[1] for over an hour and 150 ppm for 10-50 minutes before triggering an alarm. This poses a significant risk of prolonged exposure to CO well beyond allowable limits, potentially resulting in severe

[1] PPM or Parts Per Million is a unit used to describe very small concentrations of a substance in a larger solution. PPM means 1 per every 1,000,000 or 1/1,000,000.

health consequences. Regularly calibrated portable/personal four-way gas detectors are considered the most reliable means of detecting CO accumulations, especially in areas that might otherwise go undetected.

In light of these recent findings, necessary actions must be taken to mitigate such exposure events. It is imperative to conduct assessments of various machinery emitting CO to identify potential exposure risks. Additionally, it is essential for individuals to familiarize themselves with exposure limits and recognize potentially harmful exposure incidents.

Furthermore, it is crucial to adhere to the exposure standards established by the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA). These standards include:

- NIOSH time-weighted average (TWA) limits of 35 ppm with an upper limit of 200 ppm.
- OSHA sets the TWA at 50 ppm.
- OSHA Permissible Exposure Limit (PEL) for CO, also set at 50 ppm.
- OSHA standards that prohibit worker exposure to more than 50 ppm during an 8-hour period.
- The 8-hour PEL for CO in maritime operations is also 50 ppm.
- Additionally, maritime workers must be removed from exposure if the ambient CO concentration exceeds 100 ppm.

In accordance with 29 CFR 1926. 55 (a)-(b), **employee exposure must be limited, and engineering controls methods should be implemented to mitigate exposure** to hazardous substances, including CO. Therefore, it is advisable to follow the procedures outlined in 29 CFR 1926.57 (a)-(d)(2) for CO emissions, with specific attention to 29 CFR 1926.57(f)(1)(viii) as a guide for effective ventilation practices to mitigate exposure to harmful substances.

In addition to the above, BSEE recommends that operators and their contractors, where appropriate, consider doing the following:

- Ensuring ventilation is properly functioning and backup sources of ventilation are available. Ventilation should move the CO away from heavily trafficked areas, living quarters, and offices, preferably to a higher area to minimize the risk of exposure.

- Regularly verifying the integrity of exhaust piping to ensure it is correctly configured, free from obstructions, and well-maintained. Routinely inspecting this configuration to confirm the absence of corrosion, holes, or any other damage.
- Ensuring personnel are aware of CO poisoning and illnesses, can recognize the symptoms, and know the treatments.
- Using signage or other clearly identifiable means to call attention to the areas prone to create CO, such as generators, gas-powered equipment, etc.
- Planning and placement of CO-exhausting machinery should be carefully considered so that CO cannot accumulate in high traffic or living areas directly above machinery. If unable to change the configuration, pipe the CO away from these areas.
- Ensuring that any gas detection equipment is regularly inspected, maintained, calibrated, and properly worn by all personnel aboard the offshore facility.
- Regularly reviewing NIOSH and OSHA CO occupational exposure information found in the NIOSH Workplace CO Exposure and OSHA CO Fact Sheet.

– BSEE –

A **Safety Alert** is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding a potential safety issue. It also contains recommendations that could assist avoiding potential incidents on the Outer Continental Shelf.

Category: Gas Release, Living Quarters, Chemical Exposure, Personnel Safety