Crew fatality in a cargo tank

Despite several recent deaths during enclosed space entries, we have again been reminded that entering cargo tanks without proper ventilation and gas measurements can be fatal. Below we highlight a recent tragic incident that occurred on board a Gard entered vessel during a manual cleaning operation in a cargo tank. The incident resulted in the unfortunate death of four seafarers and the investigation revealed a lapse in following basic enclosed space entry procedures.

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Cargo tanks often contain residual gases and vapours that can be toxic or flammable. Without adequate ventilation, these gases can accumulate to dangerous levels, posing a risk of asphyxiation, poisoning, or explosion. In this incident, the continuous heating of Coconut Fatty Acid Distillate resulted in the emission of a harmful level of Carbon Monoxide (CO), a colourless and odourless gas that can be lethal even at low concentrations.

In the incident the crew members were required to enter a cargo tank to squeegee the residual cargo towards the bell mouth during discharging. While the crew were able to carry out the necessary operation, the fatalities occurred as they were exiting the cargo tank.

The investigation by the port authorities revealed high levels of carbon monoxide when the cargo was continuously heated over a period of time. Carbon Monoxide is a by-product of incomplete combustion and can be emitted when certain cargoes are heated above their flow point. In this incident, gas testing revealed that the CO content in the cargo tank top sides reached dangerous levels. This was not expected given that the MSDS of the cargo does not state any hazards of CO emissions due to heating.

Safety Recommendations

Gard has published several articles on Enclosed Space Entry fatalities. Our most recent article looks at improved safety recommendations for entering enclosed spaces . To reiterate the recommendations from the article:

• The hazards of the unknownSeemingly unharmful cargoes like vegetable oils are very likely to emit CO when heated. Hot surfaces of heating coils could cause decomposition during the formation of Carbon Monoxide (CO) during unloading operations. Always monitor CO concentration before and during tank entry at all levels of the tank. The heating instructions required the cargo to be between 40 -45 Deg C. However, the cargo reaches much higher temperatures as the volume drops to stripping level.
• Enclosed Space Entry PermitsGiven the unknown hazards of liquid cargoes we remind seafarers that entry into any cargo tank should be conducted with proper enclosed space entry permits. Before entering any cargo tank, conduct a thorough risk assessment to identify potential hazards, including the presence of toxic gases at all levels. Ensure that all crew members are aware of the risks and are trained in safe entry procedures.
• Ensure Proper VentilationAlways ensure that cargo tanks are adequately ventilated before entry and throughout the period of work activity in the space. Continuous ventilation and gas monitoring should never be compromised no matter how safe the cargo is declared to be in the MSDS.
• Monitor Cargo TemperatureRegularly monitor the temperature of the cargo, especially when heating is required. Be aware of the flow point of the cargo and the potential for CO emissions when heated. Implement procedures to control heating and prevent overheating of the cargo.
• Continuous MonitoringThe atmosphere should be tested frequently whilst the space is occupied, and persons should be instructed to leave the space should there be any sign of deterioration in the conditions. Particular care should be taken when working in spaces where conditions change during the work, such as increase in ambient temperature, and increased frequency of testing of the atmosphere should then be performed.
• Use Personal Protective Equipment (PPE)Ensure that all crew members entering cargo tanks are equipped with PPE, including gas detectors, respirators, and protective clothing. Conduct regular training and drills to ensure that crew members are proficient in the use of multi gas detectors.
• Implement Emergency Response PlansDevelop and implement emergency response plans for incidents involving toxic gas exposure. Ensure that all crew members are familiar with these plans and know how to respond in an emergency. Remember, fatalities have also involved those entering enclosed spaces to rescue fallen crew mates. Conduct regular drills to test the effectiveness of the emergency response plans and identify areas for improvement.

Conclusion

This tragic incident serves as a stark reminder of the risks associated with entering cargo tanks without proper ventilation and the potential for Carbon Monoxide emission from heated cargo. By implementing the recommended safety measures, shipowners and managers can help protect their seafarers and prevent similar incidents in the future. Most investigations related to enclosed space entries reveal basic lapses in following safe procedures which are preventable.