



UNITED STATES COAST GUARD

U.S. Department of Homeland Security

MARINE SAFETY ALERT

Inspections and Compliance Directorate

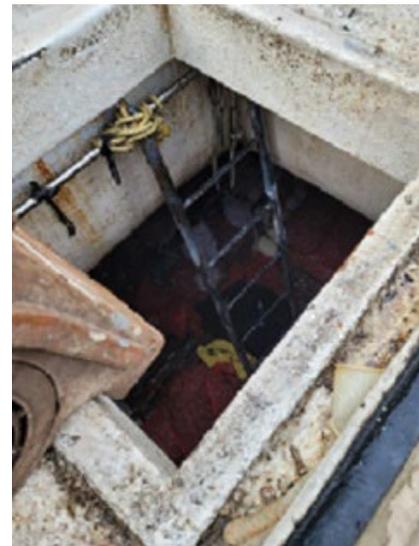
March 29, 2021
Washington, DC

Safety Alert 02-22

DANGEROUS GAS BUILDUP IN FISH HOLDS

This Safety Alert addresses the importance of verifying atmospheric conditions in fish holds on commercial fishing vessels. There are specific hazards associated with the use of brine dip solutions, a common substance used in the industry. Brine dip combined with standing water can produce dangerous levels of hydrogen sulfide (H₂S). The U.S. Coast Guard is currently investigating a marine casualty where dangerous levels of H₂S were present on a commercial fishing vessel, resulting in the hospitalization of crewmembers on board.

Four crewmembers onboard a commercial fishing vessel noticed an unusual odor coming from the fish hold while conducting shrimping operations. While under the assumption that the odor was due to a leaking refrigerant line, the crew hauled in their nets and began transiting back to port to have their system inspected by a service technician. As they were packing the last haul of catch into bags, one of the crewmembers went down into the fish hold to retrieve more bags. The crewmember subsequently fell back into the hold as he was trying to exit the space. A second crewmember failed to recognize the potential hazard and rushed into the space to provide assistance; however, he was immediately overcome by the gas and also fell into the hold. The two remaining crewmembers removed the fish hold hatch cover and attempted to rescue the two fallen crewmembers from the main deck. The Coast Guard along with the local fire department's certified confined space entry team successfully rescued the unconscious crewmembers and transported them to local hospitals where they remained in intensive care for several days.



Immediately after exposing the bilge spaces, portable gas meters alarmed due to detection of high levels of H₂S and the fish hold was evacuated. Additionally, standing water was observed in the bilge. After the crew introduced forced air ventilation and pumped the water out of the bilge, the levels of H₂S began to drop. The bilge had to be flushed four times before H₂S readings reached zero. A refrigeration technician determined the vessel's refrigerant system was operating properly.

The investigation revealed several contributing factors. The crew had disabled the high water alarms in the bilge during cleaning and never re-activated them after the previous trip. The vessel



Figure 2: Portable gas meter with levels of H₂S detected upon removal of bilge covers.

had been recently forced into port by a storm and while in port the crew offloaded the catch and locked the boat up without conducting a typical cleaning of the fish hold. After the storm passed, the vessel got underway without assessing or pumping out the bilges. The sacks of shrimp that were caught were not drained thoroughly prior to placing them in the fish hold, causing them to drip water and excess brine mixture containing Sodium-Metabisulfite into the shaft bilge space. The labeling on the brine mixture packaging clearly states, “contact with water, ice, acids or oxidizing agents will release Sulfur Dioxide (SO₂) gas”.

The Coast Guard **strongly recommends** that owners, operators, crewmembers and all who work or may be employed onboard vessels that catch, package or store fish ensure that all precautions are taken while entering and working within fish holds (an OSHA defined confined space) with brine dip mixtures. Crews must ensure bilges are free of standing water as much as possible and all high water alarms are functioning as designed to ensure that hazards are reduced to the fullest extent possible.

In addition, the following **recommendations** are made to all owners and operators of commercial fishing vessels:

- Develop a checklist to ensure the vessel is ready to proceed to sea in all aspects, including bilges that are clean and free of standing water and all high water alarms are functioning properly prior to getting underway.
- Conduct routine training with all new employees regarding hazards of confined space entry into fish holds and recognition of what different odors could mean (e.g., the smell of rotten eggs followed by disappearance of the smell may indicate the presence of H₂S at a concentration level that poses an immediate threat to life).
- Consider providing safety equipment such as portable H₂S gas detectors for their vessels and use them in accordance with the manufacturer’s recommended guidance.
- Keep brine out of the fish hold as much as practicable by allowing the sacks dipped in brine to drain for a sufficient amount of time before being placed into the hold.
- Monitor water accumulation in the bilges while underway and pump them down as needed.



Figure 3: Warning label on a bucket of Sodium-Metabisulfite.

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