TOXIC GASES CAN KILL

The Story

In spite of better air conditioning and circulation systems on newer ships, gas hazards continue to exist for engineers. Special care should be taken for the removal of toxic gases from idle boilers, empty tanks, void spaces and confined areas before workmen enter them.

In one recent tragedy, a boiler had been washed out, left to dry, and then sealed up for a considerable time. When the manhole plate was removed, an engineer entered at once and died on the spot. Hindsight showed that this individual had been killed by oxygen deficiency, for the moist iron surfaces of the boiler had used up the limited amount of oxygen available in the enclosed space. Boilers should not be entered until they have been thoroughly ventilated and tested.

On-board tanks that have been sealed for relatively long periods may be unsafe to enter, even though they contain no oil or other cargo residues. Accidents have occurred in tanks painted on the inside but normally empty and hermetically sealed for long periods of time. Similarly, casualties have occurred in tanks that are at times filled with water for ballast or other use notably the double bottom and peak tanks of merchant vessels.

Years ago, two disasters occurred in the tanks of a Navy vessel. These events took place in blister tanks, those tanks which form part of a vessel's hull. In one case, three men were overcome after working for a shift in one of these tanks; their deaths were later blamed on carbon monoxide poisoning. In the second accident, a man who entered a lower blister compartment 5 minutes after the manhole plate had been removed was overcome, and several other men who entered the tank to rescue the first victim also lost consciousness. Two of the men died, but the others recovered without permanent ill effects. This tank had been painted with redlead, but the paint had come off in a number of places allowing the contained air to reach the metal. Oxygen deficiency and carbon monoxide were the probable cause of death.

Carbon monoxide does not, however, seem to have caused a number of disasters in empty peak and double bottom tanks of merchant vessels. In these cases, oxygen deficiency was apparently the major factor. Free air normally contains about 21 percent of oxygen by volume, but men can work with decreased efficiency when the oxygen is as low as 16 percent. If the volume of oxygen drops to 8 or 11 percent, loss of consciousness occurs. When only 6 percent of the air is oxygen, death will occur in 6 to 8 minutes.

It is important, before inspecting an empty peak or double bottom tank, to remember that moist steel surfaces consume oxygen by rusting. On one ship, the volume of oxygen in an empty hull tank had dropped to less than 4 percent.

There is nothing in the appearance or odor of the air in such tanks to indicate oxygen deficiency. This makes them particularly dangerous, since workmen can collapse without warning and be killed after several minutes of exposure to an inadequate supply of oxygen.

Harsh as it is to say, rescue attempts in such situations have too frequently resulted in additional deaths. Rescuers often like the casualty victims fail to recognize the potential hazards and attempt the rescue without using the proper safety equipment such as hose-masks and self-contained breathing apparutus.

Lesson Learned

The use of properly maintained oxygen detectors and explosimeters cannot be overstated. Tanks and confined spaces onboard commercial vessels should be tested prior to entry, before any work is performed. Vessel operators should ensure that tank entry and confined space procedures are established and that vessel crewmembers are knowledgable in all entry requirements and safety precautions.

Prevention Through People

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