

## **Refrigerant Hazards**

### **The Story**

Recent casualties involving refrigeration leaks aboard commercial fishing vessel's call to mind the need for all mariners; particularly those working on vessels with extensive refrigeration systems, to be mindful of the potential hazards associated with refrigerants. Combined, a total of 24 individuals were overcome in two separate cases by anhydrous ammonia, a potentially toxic refrigerant commonly used in the commercial fishing industry. Both cases took place while repairs to the vessel's refrigeration systems were underway and they each involved the discharge of approximately 1,000 pounds of ammonia. The first case occurred while a leaky refrigeration coil, damaged by shifting cargo, was being repaired. The second instance was the result of an over-pressurization of a supposedly "isolated" coolant line. High pressure in the line opened a safety valve venting the refrigerant directly on deck in the vicinity of 7 crewmembers. Injuries in these cases varied in degree but can range from mild skin and respiratory burns to possible death.

Mariner's also need to be aware of the indirect hazards associated with refrigerants. A fire, which occurred aboard a large fish processing vessel in 1994, subsequently lead to the release of approximately 20,000 pounds of anhydrous ammonia into the vessel's cargo spaces, processing area and the atmosphere putting the almost 250 people on board at considerable risk. Luckily the vessel's evacuation was successful and completed before the release of the ammonia. In this instance one crewmember lost his life due to smoke inhalation and several others incurred minor injuries in the evacuation itself. Under slightly different, less ideal circumstance the outcome could have been much different. Had the vessel not been near sheltered waters, away from high concentrations of people, and not have had several rescue craft readily available to assist in the crew's evacuation, a leak like this could have been catastrophic.

Freon, a colorless, nontoxic, relatively benign fluorocarbon gas extensively used in it's various chemical compositions as a refrigerant in the marine industry, is widely considered to be a safe. However, like ammonia, it can be quite hazardous and even lethal. Freon is heavier than air and will displace oxygen which can be especially dangerous if it occurs in a small, enclosed, unventilated space. This was the case in the asphyxiation death of an engineer aboard a factory trawling-processing vessel in 1994. Others have been injured due to oxygen deprivation, burns caused by frostbite and even poisoning; not by the freon itself but by a by-product of the freon when it reacts with intense heat or an open flame. Under these conditions a toxic gas, phosgene, is created. In the summer of 1993 an accidental discharge of approximately 40 pounds of freon in a commercial fishing vessel's engine room did just that.

The freon was introduced into the main diesel engine intake and discharged as phosgene gas via the exhaust system. A crewman near the exhaust inhaled the fumes and suffered lung burns.

## **Lesson Learned**

*To say these incidents are uncommon or "freak" in nature may be true. However, mariners are cautioned that the risks associated with refrigerants are very real, ever present and should not be discounted as trivial. Extreme care and attention should be taken when dealing with refrigeration systems.*

**Prevention Through People**



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