



MARINE SAFETY ALERT

Inspections and Compliance Directorate

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Washington, DC

Safety Alert 09-02

TANK EXPLOSION

The Marine Safety Unit at Galveston, Texas reports the following casualty. Recently, a 13,700 GT Chemical tanker suffered a major tank explosion and fire at an offshore anchorage in the Gulf of Mexico. The early morning explosion occurred in an empty cargo tank that had previously contained benzene.

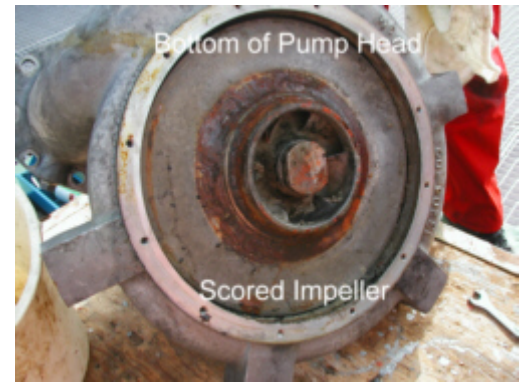
Upon nearing completion of tank washing while stripping the tank, the vessel's pumpman opened the tank top cover. Air immediately rushed in and an explosion occurred. The centerline bulkhead between the ignition space and the adjacent cargo tank ruptured. A fire also developed and was extinguished in twenty minutes by the ship's crew using a water/foam mixture.

The pumpman was severely burned and required an evacuation to a medical facility. The cargo hold was severely damaged and resultant structural and machinery repair costs are expected to be significant.



The investigation into this casualty is not complete. This information serves as a reminder and is provided only to assist vessel owners, operators, shore-support staff, crews, and engineering personnel in assessing and understanding risks associated with the operation, maintenance, and repair of their vessels.

A preliminary investigation reveals that the upper bearing of the cargo pump located deep within the tank had failed. The shaft and impeller shifted axially one half an inch causing the impeller to contact and spin against the end plate of the pump casing. The resultant friction caused extreme heat and possibly sparks which ignited the atmosphere in the tank.



Pump and Motor Assembly

The pump is driven by a drive shaft enclosed in an oil filled assembly. The shaft is rotated by an electric motor encased in an explosion/weather-proof housing on the open deck above the tank. The pump end known as the "pump head" is located at the bottom of the cargo tank. Two discharge lines are provided and connected at the pump head, one for normal high capacity discharge operations and another for "stripping" operations.

When the cargo tank is near empty, the pump's stripping line valve is opened and its main discharge closed. The pump is kept running while the remaining product in the discharge line or in the tank is removed via the stripping line.

Explosion

When the tank top cover was opened, enough fresh air was introduced to allow the benzene vapor content to fall below the upper explosive limit and into the explosive range. The vapor in the presence of the operating but severely overheating cargo pump components ignited and caused the explosion.

To reduce the risk of fatalities, injuries, environmental damage and severe economic loss the U.S. Coast Guard **strongly recommends** that owners, operators, superintendents, port engineers, shipboard engineers and crewmembers of vessels having similar equipment and systems:

- Ensure that the proper maintenance and repair as recommended by the manufacturer is accomplished for all pump, motor and drive components.

This safety alert is provided for informational purpose only and does not relieve any domestic or international safety, operational or material requirement. Developed by the Office of Investigations and Casualty Analysis. For questions or concerns please email hqs-pf-flidr-cg-inv@uscg.mil.