

M-130

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: September 10, 1980

Forwarded to:

Admiral John B. Hayes  
Commandant  
U.S. Coast Guard  
Washington, D.C. 20593

SAFETY RECOMMENDATION(S)

M-80-56 through -61

About 2140 c.s.t. on April 19, 1979, the Liberian tankship M/V SEATIGER, which had suspended pumping seawater ballast into its cargo tanks because of electrical storms in the area, exploded, burned, and sank at a berth at the Sun Oil Terminal, at Nederland, Texas. The SEATIGER was severely damaged in the area of its cargo tanks. Two crewmembers were killed. The total losses resulting from the explosion were estimated to be \$35 million. The terminal berth was out of service for 180 days. 1/

The SEATIGER arrived at Berth No. 3, at 1040 on April 18, 1979, and berthed portside to. The draft of the vessel arriving at the terminal was 37 ft 5 in. Discharging of the cargo commenced at 1500. During the discharging of the cargo of crude oil, the tank valves were hydraulically operated from the pumping control station located on the main deck in the forward part of the deckhouse. Discharging was temporarily suspended from 1717 to 1815 and from 1935 to 2100 because of electrical storms, but then continued throughout the night and into the next day.

Testimony revealed that the closed gauging system for determining the amount of cargo in the tanks was defective in several of the tanks. The gauges in Nos. 2 center, 2 port, 3 center, and 5 port tanks were found to be inoperative. With the closed gauging system not functioning properly, the ship's master elected not to use the vessel's inert gas system, reasoning that when the ullage covers were opened to monitor the pumping, the gas would be exhausted to the atmosphere instead of providing a blanket of noncombustible gas over the surface of the cargo inside the tanks.

The cargo tanks of the SEATIGER were neither inerted nor in a gas-free condition. The tanks were vented into a common line that led to the vertical vent pipe attached to the port kingpost located just aft of the cargo manifold. Highly explosive vapors were allowed to vent to the atmosphere through the vent pipe. Discharging was completed about 1630 on April 19 and ballasting began at 2050 with the vent system still open. The top of the vent pipe was fitted with a flame arrester with a hinged cover. Inspection of the flame screen after the accident revealed that it had been

1/ For more detailed information, read "Marine Accident Report—Liberian Tankship M/V SEATIGER Explosion and Fire, Sun Oil Terminal, Nederland, Texas, April 19, 1979" (NTSB-MAR-80-12).

improperly installed. It had been placed upside down so that four small positioning tabs extending from one end were not placed down in the vent pipe. With the flame screen incorrectly installed, the clearance around the edge between the screen and the cover was improper, and the hinged cover could not be secured correctly to provide a tight closure. In addition to the vapors passing through the mesh of the flame screen, they rose vertically and passed out around the edge of the hinged cover. When lightning struck the top of the vent mast, the vapors on the vent exterior ignited, the flame traveled through the improperly installed flame screen, down the mast through the vent pipes on deck, and ignited the vapors in the tanks, which resulted in the explosion.

Flame arresters that are designed for flame quenching in a vent pipe system are found in various configurations. The cylindrical, double-mesh screen type installed on the SEATIGER was apparently repaired, when required, by the ship's crew. It could not be determined whether the original dimensions were adhered to when the screen was rebuilt, or whether the fit would have been proper if the screen had been installed correctly. The location on top of the mast discouraged inspection and maintenance although it almost insured that it would be one of the first parts of the vessel to be struck by lightning.

The improper installation of the flame screen in the vent mast contributed to the cause of the explosion. With the flame screen in the inverted position, it would not fit correctly in the vent pipe, and the vent pipe cover could not be closed tight enough to provide a proper seal. The design of flame screens which permits one manner of installation in a flame arrester would probably prevent occurrences such as this. To insure that a similar condition does not occur on a U.S. vessel, future Coast Guard approval of designs of flame arresters should require this feature.

Therefore, the National Transportation Safety Board recommends that the U.S. Coast Guard:

Include in the Coast Guard boarding officer's checklists for loaded oil tank vessels entering United States ports, a checklist item on the condition of inert gas systems. (Class II, Priority Action) (M-80-56)

Require all foreign and domestic crude oil carriers of 20,000 dwt and above that are equipped with an inert gas system to place the system in operation while in United States waters except when cargo tanks are gas free. (Class II, Priority Action) (M-80-57)

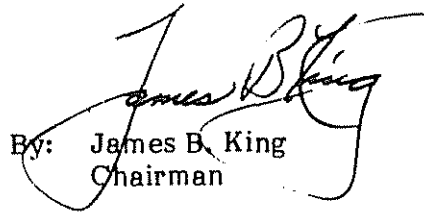
Require oil terminals to include in their "Declaration of Inspection Prior to Bulk Cargo Transfer" as required by 33 CFR 156.150 and 46 CFR 35.35-30 that the installed inert gas system be in operation before cargo transfer is commenced. (Class II, Priority Action) (M-80-58)

Require all foreign and domestic crude oil carriers that are transferring cargo at United States ports to advise the local Coast Guard Captain-of-the-Port if a malfunction occurs in their inert gas system, and to suspend transfer operations until permission is granted by the Coast Guard to resume operations. (Class II, Priority Action) (M-80-59)

Instruct inspectors who conduct biennial or midperiod examinations of tank vessels to inspect all flame screens, including those installed in flame arresters, regardless of location, and require them to be placed in satisfactory condition as necessary. (Class II, Priority Action) (M-80-60).

Include in the approval requirements of drawings and specifications for flame arresters that flame screens be physically incapable of incorrect installation. (Class II, Priority Action) (M-80-61)

KING, Chairman, McADAMS and BURSLEY, Members, concurred in these recommendations. DRIVER, Vice Chairman, and GOLDMAN, Member, did not participate.

  
By: James B. King  
Chairman