

M-135

# NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

ISSUED: October 16, 1980

Forwarded to:

Mr. W.H. Banks  
President  
Chevron Shipping Company  
555 Market Street  
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SAFETY RECOMMENDATION(S)

M-80-97 through -98

At 1412 c.d.t., on September 1, 1979, while discharging cargo at the Deer Park Shell Oil Company terminal on the Houston ship channel, the American tankship SS CHEVRON HAWAII exploded, burned, and sank after it was struck by lightning. A hull fragment from the exploding vessel penetrated a petroleum product tank at the terminal and caused the tank to explode and the contents to burn. The vessel fire spread into a barge slip where four barges were discharging cargo; all four caught fire, three of which exploded and sank. One crewmember and 2 radar repairmen aboard the vessel were killed, and 13 persons were injured. Damage to the CHEVRON HAWAII was estimated at \$50,000,000. Damages to the terminal, barges, and other vessels, and accident related claims exceeded \$27,000,000. 1/

The CHEVRON HAWAII had left San Pedro, California, with a split cargo of Santa Maria Crude (SMC) for Corpus Christi, Texas, and catercracker feed stock (CFS) for the Shell Oil Company terminal at Deer Park, Houston. After discharging the SMC, the vessel's cargo tanks were washed with heated saltwater. The tank washing was completed at 1645 on August 31, 1979. The tankship then proceeded to the Shell terminal crude dock where it berthed at 2248. According to testimony presented during the investigation, all of the tank washing cover plates were secured and the tank vents and cargo hatches were closed after completing the tank washing.

At 1412, on September 1, 1979, the discharge of CFS cargo from the Nos. 2, 4, and 5 center tanks had been stopped because of a developing electrical storm when the CHEVRON HAWAII was struck by lightning and exploded. The second mate, on cargo watch, said he saw a ball of fire at the juncture of the Nos. 1 and 2 port tanks about midway between the vessel's centerline and the port railing. The chief mate of the M/V VENTURE ITALIA, which was berthed across the Houston ship channel, said he had seen lightning strike between the CHEVRON HAWAII's Nos. 1 and 2 tanks, but he was not sure whether the lightning had hit the vessel or the Shell Oil Company terminal beyond.

1/ For more information, read "Marine Accident Report—Explosion and Fire On Board the SS CHEVRON HAWAII with Damages to Barges and to the Deer Park Shell Oil Company Terminal, Houston Ship Channel, September 1, 1979" (NTSB-MAR-80-18).

At the time of the explosion, the wind was reportedly from the east at 9 to 10 knots, blowing from the stern toward the bow of the CHEVRON HAWAII. Consequently, any flammable cargo vapors emitting from the two after vent masts, or from any deck vents or openings, would have been carried forward along the deck toward the vessel's forecastle. Upon reaching the raised forecastle, such vapors would have been trapped in the pocket formed by the forecastle vertical bulkhead and the side shell plating which was faired to the port and starboard deck edge railings.

Although the CHEVRON HAWAII's SMC tanks had been washed, the tanks were not gas-freed. The CFS cargo had to be heated before discharge so that it would flow easily. Heating of the CFS cargo tanks also heated the bordering SMC tanks. Consequently, the SMC tanks, already heated from tank washing, were maintained in a heated state and the vapors within the tank would have been circulated and expanded in the process. The expanding SMC vapors would tend to seek any outlet to escape from the tanks. The most convenient outlets would have been the vapor control vent masts, vent line pressure valves, tank washing deck openings, or possibly wasted vent system piping or fittings. The most vulnerable and dangerous parts of the venting system would be the tank deck openings, damaged gaskets, and damaged or improperly installed flame screens. Even though the lightning ignited cargo vapors on deck, the flame should not have propagated into the cargo tanks if all closures were tight and properly secured. The most probable access for flame to penetrate a cargo tank on the CHEVRON HAWAII was through an ullage opening which was not properly closed or fitted with a flame screen, or through a tank washing deck opening which was not properly gasketed or which had not been tightly secured.

The Safety Board believes that when lightning struck the CHEVRON HAWAII and ignited flammable cargo vapors on deck, the flame propagated into the nearest inadequately sealed tank close to the lightning strike. Because of the way the main deck was peeled back and the nature of the damage to the cargo tanks, it appears that the No. 1 center cargo tank, which had contained SMC cargo, was the first tank to ignite and explode. The explosion sequence then continued through tanks Nos. 2, 3, 4, and 5. The Safety Board believes that more stringent inspection procedures are needed to insure that tank closures are properly maintained and that such action should be instituted on the CHEVRON HAWAII sister ships.

When the CHEVRON HAWAII exploded and burned, the crewmembers remaining aboard were trapped in the after accommodations area. The destruction of the port lifeboat forced the crew to use the starboard lifeboat which had been damaged in the explosion. It took 15 minutes to abandon the vessel. The two radar repairmen, who were leaving the vessel via the gangway placed near the portside manifold, were killed in the explosion. The Safety Board in its investigation of the M/T ELIAS accident <sup>2/</sup> expressed concern for visitor safety and the placement of gangways or brows over tank decks and recommended that the Coast Guard take corrective action. It is recommended that ship operating companies also require that terminal operators provide for safe gangway arrangements or brows at vessel cargo transfer berths.

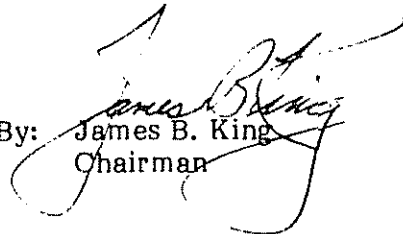
Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Chevron Shipping Company:

<sup>2/</sup> For more detailed information, read "Marine Accident Report--M/T ELIAS Explosion and Fire at the Atlantic Richfield Company Fort Mifflin Terminal, Delaware River, Pennsylvania, April 9, 1974" (NTSB-MAR-78-4).

Institute more stringent supervisory control and inspection procedures to insure that moisture control or tank washing deck covers, flame screens, and cargo tank vent closures are properly secured and maintained on fleet sister-ship tank vessels, and that damaged or missing gaskets, flame screens and securing fittings related to the tank vapor control system are immediately replaced. (Class II, Priority Action) (M-80-97)

Require that tanker terminal operators provide for a safe gangway or brow, between tanker crew accommodation locations and the terminal for the use of crew and authorized visitors, clear of tank decks and cargo transfer areas. (Class II, Priority Action) (M-80-98)

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

By:   
Chairman