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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: June 5, 1978

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Forwarded to:

Admiral John B. Hayes  
Commandant  
U.S. Coast Guard  
Washington, D.C. 20590

} SAFETY RECOMMENDATION(S)

M-78-35 through -44

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On April 9, 1974, the M/T ELIAS, of Greek registry, was discharging a cargo of crude oil at the Atlantic Richfield Company (ARCO) Fort Mifflin Terminal on the Delaware River at Philadelphia, Pennsylvania. About 2150 e.d.t. several explosions occurred, fire engulfed the ship, and it sank at its berth. The ELIAS was destroyed, five crewmembers and three visitors were killed; four crewmembers and one visitor were listed as missing. Damage to the ARCO terminal was estimated at \$2 million. The tanker S/S STEINIGER (Liberian) at the adjoining berth was slightly damaged and surrounding waters were polluted with oil. The sunken hulk of the ELIAS obstructed use of the berth for 19 months before all wreckage was removed. 1/

Less than 18 hours before berthing at Fort Mifflin, the ELIAS had sustained a fire on board at No. 3 starboard wing tank, which was later attributed to a fire which originated in the midshipouse at the main deck. An emergency message broadcast by the ELIAS was intercepted by the Coast Guard, Fifth District (CCGD FIVE), at Norfolk, Virginia. Within 30 minutes, and before the Coast Guard activated units to assist, the ELIAS cancelled its emergency message. As no search and rescue (SAR) action was required by CCGD FIVE, the case was closed. CCGD FIVE sent a priority message describing the incident to the Commander Atlantic Area with the Coast Guard Commandant; Captain of the Port, Philadelphia; and the Marine Inspection Office, Philadelphia as information addressees. At this time, the ELIAS posed a potential hazard to its arrival port. The Coast Guard message indicated the ELIAS was carrying "Bunker C" cargo while the ship was actually loaded with crude oil. Slow response by Coast Guard offices in the Philadelphia area allowed routine berthing of the ELIAS at the Fort Mifflin terminal.

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

Boarding inspection, and investigation of the reported fire, by the Coast Guard did not take place for 19 hours after the start of cargo discharge. The inspection and investigation were brief and not coordinated; the boarding inspection team was not involved in the fire investigation. The cause of the fire was not determined. Although identified in the Coast Guard message, there is no evidence that the Philadelphia agent of the ELIAS was contacted before the ship's arrival. Similarly, there is no indication that the pilot or management of the ARCO terminal were advised of the ELIAS fire, or that special precautions should be taken in handling the ship. In general, once the SAR emergency was cancelled, there was a lack of coordinated communication and action relative to the movement and operation of the ELIAS and no indication it was considered a potential hazard to the port. The destruction of the ELIAS precluded positive determination that the fire on April 7 and the explosion on April 9 were not related, but it is possible that the source of ignition could have been the same.

The ELIAS was positioned at Berth "A". Testimony revealed that Berths "A" and adjoining "B" had been damaged by the SS CHRYSANTHY on April 5, 3 days before the ELIAS berthed. Surveys of Berths "A" and "B" were made by ARCO management and local consulting engineers on April 8, the day of the ELIAS' arrival. Despite damage to electrical conduits and a malfunction in the pier's electrical cathodic protection installation, ARCO management considered the pier and berths safe. The ELIAS and subsequently the STEINIGER were berthed to discharge their crude oil cargoes. Although there was \$200,000 estimated damage to the pier, the manager of this "designated waterfront facility" was not required to report the damage to the Coast Guard. Similar facilities such as artificial islands and fixed structures on the outer continental shelf, and deep water ports have regulations (33 CFR Subchapters N and NN) requiring that a casualty or accident report shall be submitted when any component is hit by a vessel and damage to property is in excess of \$1,500. In this instance therefore, the ELIAS, a possible hazard because of the fire at sea, was berthed at a designated waterfront facility which might have been classed as unsafe; the hazards were therefore compounded.

The ARCO pier at Fort Mifflin could be compared to a man-made offshore island, joined to the main terminal by two causeways. The two causeways provide access to the pier for personnel and support piping systems for cargo operations, ship services, and firefighting equipment. Several undesirable features in the arrangement become apparent from the ELIAS accident. The Berth "A" causeway, in line with the cargo section of the ELIAS, was heavily damaged and engulfed in flame during the conflagration; as was the dockman's crane control booth. Pipelines, firefighting equipment, and associated services were destroyed or damaged and firefighting delays were therefore encountered while additional resources were obtained from distant terminal locations.

Berthing the ELIAS portside to Berth "A" placed the afterhouse accommodations at the extreme end of the pier and away from both causeways. Escape routes for crewmembers and visitors were therefore blocked or inaccessible during the fire. The gangway, located in the vicinity of the cargo manifold, was destroyed immediately in the explosion. Consequently, the only method of escape from the ship was to jump into the water from the stern and swim ashore. The swimmers then faced the prospect of being consumed in the spreading waterborne oil fire before reaching the shore. As in the QUEENY-CORINTHOS accident <sup>2/</sup>, launching of cradled lifeboats was impossible. Had a suitably designed lifeboat aft been rigged as a "ready boat," more rapid launching from such position could have provided effective escape from the ship. The lifeboats of the ELIAS were not, however, designed to withstand the waterborne fire and their use in this accident would have proved more hazardous than swimming ashore. A significant number of United States waterway terminals are similar to the Fort Mifflin design, and piers are positioned at varying distances from the shoreline. Loss of causeway access and environmental factors, e.g., tides and currents, which increase escape difficulties, pose personnel safety problems which should be reviewed not only relative to ship crewmember safety, but the terminal employees as well. Had the ARCO crane operator been in the crane control booth at the time of the accident, he would have become an additional casualty.

Tankships with a midshiphouse over cargo tanks and transporting crude oil, or flammable cargo, should be categorized and handled as potentially dangerous if not gas-freed or inerted. Appropriate caution should be incorporated in the Coast Guard Marine Safety Information System (MSIS) and the Port Safety Reporting System (PSRS) to insure that priority and special attention is given to monitoring the operation and movements, and prompt inspection of these tankships.

Relative to 46 CFR Part 35.30-1(b), it is doubtful whether the posting of the warning sign serves any useful purpose in protecting either the vessel or the lives of uninformed visitors.

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

Implement communications practices to insure that pilots, ship operating agents, terminal operators, and port firefighting authorities are informed of potentially hazardous ship movements. (Class II, Priority Action) (M-78-35)

<sup>2/</sup> "Marine Accident Report -- SS EDGAR M. QUEENY Collision with the Liberian S/T CORINTHOS, Marcus Hook, Pennsylvania, January 31, 1975," (USCG/NTSB-MAR-77-2).

Improve the promptness and effectiveness of boarding programs and special investigative procedures on tank vessels, and review the adequacy of checklists to aid in the detection of potentially hazardous shipboard conditions. (Class II, Priority Action) (M-78-36)

In the implementation of the Marine Safety Information System (MSIS) and Port Safety Reporting System (PSRS), incorporate information on ship safety deficiencies obtained from foreign inspection sources and also from local activities responsible for ship operations, to insure effective control of such ships. (Class II, Priority Action) (M-78-37)

Establish a plan review program relative to new construction of new port terminals that evaluates the protection of firefighting systems, to minimize damage or loss resulting from explosion and to insure availability and effectiveness for firefighting. (Class III, Longer Term Action) (M-78-38)

Study the positioning of shipborne gangways and shoreplaced brows to determine ways to provide for rapid personnel escape from vessels during emergencies. (Class II, Priority Action) (M-78-39)

Promulgate regulations that control visitor movement through terminals and restrict their boarding of tankers that are not gas-free or inerted. (Class II, Priority Action) (M-78-40)

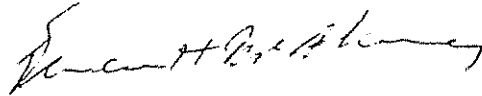
Study the feasibility of providing safer means of escape from tankers across piers to safe terminal locations, to improve chances of survival for shipboard personnel when lifeboats cannot be used and swimming ashore is not possible. (M-78-41)

Modify regulations governing "designated waterfront facilities," to require reporting of casualties and accidents to the Coast Guard, conforming to those specified for deep water ports and artificial islands. (Class II, Priority Action) (M-78-42)

Make public specific policy concerning the frequency of boarding, and the extent of examination to be made, of foreign tank vessels calling at American ports, to insure that such vessels meet U.S. safety and environmental protection regulations, as proposed in the President's message to Congress on March 17, 1977. (Class II, Priority Action) (M-78-43)

Require expeditious and thorough investigation of arriving tank vessels that might pose a threat to U.S. ports and waterways because of an on-board fire or casualty, at safety zones before permitting berthing in U.S. ports. (Class II, Priority Action) (M-78-44)

KING, Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in the above recommendations.



By: James B. King  
Chairman

