



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Log m-405

Date: DEC 22 1995

In Reply Refer to: M-95-54 through -58

Admiral Robert E. Kramek
Commandant
U. S. Coast Guard
2100 Second Street, S. W.
Washington, D. C. 20593-0001

On October 8, 1994, the Liberian tankship SEAL ISLAND was moored at the Hess Oil Refinery in St. Croix, U.S. Virgin Islands when a fire erupted in the engineroom. Three crewmembers died and six other crewmembers were seriously injured in the fire. The vessel's engineroom, accommodations house, and pilothouse were damaged such that the SEAL ISLAND was declared "no longer a useful carrier" and its owner, the Seal Island Shipping Corporation, had it towed to Spain where it was sold as scrap for \$12 million.¹

During its investigation of this accident, the National Transportation Safety Board identified several safety issues, including a lack of flammable liquid strainer spray shields, a lack of engineroom fire and escape drills, a breakdown in the incident command system, and an inadequate refinery emergency plan, which resulted in a partial lack of effectiveness in the response effort by the refinery fire brigade.

In this accident, the fire began when engineering personnel were changing the basket in a lubricating oil strainer. Lubricating oil sprayed onto the hot turbine and ignited.

As part of its investigation of this accident the Safety Board reviewed U.S. Coast Guard accident statistics for 1991 through 1995, and noted that the number of fires occurring on U.S. vessels and foreign-flag vessels in U.S. ports and waterways totaled 306. Of these, 124, or over 40 percent, were flammable liquid fires that occurred in the engineroom. This represents an average of 25 per year.

Some steam ships, mainly naval vessels, now have a sheet metal spray shield installed between the lube oil strainers and potential ignition sources for the expressed purpose of blocking an oil spray should a mishap occur. Had such a shield been installed between the duplex lubricating oil strainer and the turbine casing on the SEAL ISLAND, the oil would have been deflected away from the hot turbine machinery and may not have ignited.

¹ For further information, read Marine Accident Report *Engineroom Fire On Board the Liberian Tankship SEAL ISLAND while moored at the Amerada Hess Oil Terminal in St. Croix, U. S. Virgin Islands, October 8, 1994 (NTSB-MAR-95/04)*.

6485A

After this accident, Atlantis Agency, Inc., the management company of the SEAL ISLAND, installed spray shields at the lubricating oil strainers on board their other company ships. However, no national or international standards require this type of protection on vessels. The Safety Board believes that not only the SEAL ISLAND accident, but also Coast Guard statistics demonstrate that requiring spray deflectors on fuel oil and lubricating oil strainers would greatly improve engineroom fire safety.

From examining company records, the Safety Board determined that the SEAL ISLAND and the policies of Atlantis Agency, Inc., were in compliance with current regulatory safety requirements. The tankship was equipped with the requisite number of vessel and individual safety gear items. Further, weekly emergency response drills were held on board the SEAL ISLAND during which the crew practiced lifeboat abandon ship and firefighting procedures and using lifesaving and firefighting equipment. The drills typically simulated a fire on deck. Only one crewman interviewed recalled a fire drill on the SEAL ISLAND in which an engineroom fire was simulated. No drills were held to practice escape from the engineroom.

When the fire ignited in the SEAL ISLAND engineroom, it immediately became very large because a mist of oil filled the air. Survivors testified that they had a very short time to escape from the engineroom. Even those who had only to climb one flight of stairs to gain exit from the engineroom did not escape without injury. They said that the *engineroom quickly filled with heavy, black smoke that stung their eyes and completely blocked out the light from the emergency lights.* They said that visibility was so poor they could not see the deck and had to feel their way around until they found a stairwell to climb to safety.

Two crewmembers remained in the relative temporary safety of the lower control room. One attempted to use the control room emergency escape trunk, but was unsuccessful. The two men returned to the lower control room and shared a Self-Contained Breathing Apparatus (SCBA) until one of them reportedly panicked, grabbed the SCBA from the other, and ran from the control room. His body was later found near a stairwell aft of the control room with the empty SCBA nearby. The other crewmember left in the control room knew that an Emergency Escape Breathing Apparatus (EEBA) was in the upper control room, but could not get it because of the dense smoke. Although the SEAL ISLAND engineroom was equipped with 7 SCBAs and 11 EEBA's, they were not located along exit routes in the engineroom area in such a manner to facilitate escape from the engineroom.

Two other crewmembers used preplanned avenues of exit to escape to the main deck. Both had worked on the SEAL ISLAND before and were familiar with the vessel layout. Both had participated in shoreside firefighting training. The training, preplanning, and familiarity with the escape routes from the SEAL ISLAND engineroom helped them to react quickly and correctly escape from the engineroom.

As this accident shows, it is imperative that engineering crew members react quickly and correctly because of the rapid rate at which fire can spread within the confines of an engineroom and the large volumes of smoke that can be generated. Engineering crews should participate in

practice drills that include how to find exits, check escape trunks, and locate and don breathing apparatus so that they will react properly during an actual emergency.

Current international requirements do not specifically mandate that fire and escape drills be held in engine rooms. SOLAS '74, as amended, states, "Fire drills should be planned in such a way that due consideration is given to regular practice in the various emergencies that may occur depending on the type of ship and its cargo." This could be interpreted as a requirement for engine room drills, or, as in the case of the SEAL ISLAND, it may not. Given the high risk of engine rooms and the limited protection afforded engine room personnel, the conduct of engine room drills are very important. The Safety Board believes that these requirements are vague and subject to broad interpretation. The Safety Board concludes that the safety of shipboard engineering personnel would be significantly improved if engine room fire and escape drills were required. The Board, therefore, believes that the Coast Guard, as the official U.S. representative to the International Maritime Organization (IMO), should propose that periodic engine room fire and escape drills should specifically be required on board all ships.

Before the accident, the SEAL ISLAND's emergency diesel fire pump was tested using *only the electrical starting system during weekly fire drills conducted by the master, and during boarding examinations conducted by Coast Guard inspectors.* This was in accordance with international regulations that do not require that all modes of fire pump starting systems be tested during drills and examinations. When the fire occurred on board the SEAL ISLAND, the vessel lost electrical power. Crewmembers repeatedly tried to activate the emergency diesel-driven fire pump using the backup hydraulic starting system, but it would not turn over the fire pump's diesel engine. During postaccident tests, investigators found that the hydraulic motor was misaligned.

Had the emergency fire pump's diesel engine been periodically tested using the engine's hydraulic starting system during fire drills, the crew may have detected and corrected the problem, and been able to use the emergency diesel fire pump during firefighting operations. The Safety Board believes that the current international regulations should be revised to require testing of all available modes of fire pump starting systems, including electric, hydraulic, and pneumatic, on board ships.

The National Transportation Safety Board therefore issues the following recommendations to the U. S. Coast Guard:

Propose to the International Maritime Organization that all ships be required to maintain readily accessible emergency breathing apparatus to facilitate escape from the engine room. (Class II, Priority Action) (M-95-54)

Propose to the International Maritime Organization that periodic engine room fire and escape drills be specifically required on board all ships. (Class II, Priority Action) (M-95-55)

Propose that the International Maritime Organization develop a standard for engine room fire and escape drills that will include, at a minimum, how to locate

and don breathing apparatus and how to find and use emergency exits in simulated fire conditions. (Class II, Priority Action) (M-95-56)

Propose to the International Maritime Organization that all modes of fire pump starting systems, including electric, hydraulic, and pneumatic, be tested during fire and boat drills. (Class II, Priority Action) (M-95-57)

Propose to the International Maritime Organization that all vessels be required to install spray shields between lubricating and fuel oil strainers and potential ignition sources. (Class II, Priority Action) (M-95-58)

Also, the Safety Board issued Safety Recommendations M-95-59 to the Governor of the U. S. Virgin Islands, M-95-60 through -62 to the Hess Oil Virgin Islands Corporation, and M-95-63 to the National Petroleum Refineries Association.

The Safety Board is interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations M-95-54 through -58.

Chairman HALL, VICE Chairman FRANCIS, Member HAMMERSCHMIDT, and Member GOGLIA concurred in these recommendations.

By:



Jim Hall
Chairman