

SP-20



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Log M-352
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Date: July 7, 1989

In reply refer to: M-89-27 through -32

Bedford Ship Management
c/o Mr. Philip S. La Penta
35 Worth Street
New York, New York 10013

About 2215 on August 31, 1988, an explosion in cargo tank 1 of the 711-foot-long Maltese tank vessel FIONA killed one person and blew off the top of the cargo tank. The vessel, which was moored about 2 miles offshore near the Long Island Lighting Company (LILCO) power plant at Northport, New York, was preparing to discharge about 41,000 long tons of No. 6 fuel oil, a Grade E cargo, into the LILCO subsea pipeline. Damage costs were estimated to be \$500,000.¹

To prevent fires and explosions in the cargo tanks of vessels carrying flammable products, both the International Convention for the Safety of Life at Sea, 1974 (SOLAS) 1974 and Coast Guard regulations require that new tank vessels over 20,000 deadweight tons carrying crude oil and petroleum products having a flash point not exceeding 150° F (open cup), existing tank vessels over 20,000 deadweight tons carrying crude oil, and existing tank vessels over 40,000 deadweight tons carrying other than crude oil must be equipped with a fixed inert gas system which when operated will maintain the atmosphere of cargo tanks nonflammable at all times. The FIONA was an existing tank vessel of 48,915 deadweight tons and had an installed inert gas system. If the inert gas system had been operating when the vessel arrived at New York, the explosion could have been prevented. The FIONA master did not operate the inert gas system because the FIONA was carrying a cargo with a flash point above 150° F. The international standards contained in SOLAS 1974 and the guidelines for the interpretation of Coast Guard regulations contained in the Coast Guard Marine Safety Manual do not require inert gas systems to be operated for a cargo with a flash point above 150° F. However, Coast Guard regulations required that the master operate the inert gas system as necessary to maintain an inert atmosphere in the cargo tanks while in U.S. waters while carrying a cargo with a flash point above 150° F. The FIONA master testified that he was not aware of the Coast Guard regulations regarding the operation of inert gas systems and considered compliance with SOLAS 1974 requirements as sufficient. The Safety Board believes that the reason the master did not operate the vessel inert gas system was that SOLAS did not require its operation and Coast Guard regulations and guidance are

¹ For more detailed information, read Marine Accident Report--Explosion Aboard the Maltese Tank Vessel FIONA in Long Island Sound Near Northport, New York, August 31, 1988 (NTSB/MAR-89/03).

contradictory regarding the operation of inert gas systems. Since the Safety Board has found that some petroleum cargoes with flash points above 150° F can produce explosive vapors in vessel cargo tanks, the Board believes that the masters of all vessels equipped with inert gas systems should operate the systems as necessary to maintain an inert atmosphere in cargo tanks unless the cargo tanks are gas free.

The many vessel deficiencies found by the January 1988 Coast Guard examination of the FIONA and additional items found by the September 1988 Safety Board postaccident inspection indicate that there was little or no hull preventive maintenance performed by the present crew or the previous crew. Furthermore, there was no evidence that the present owner/operator had implemented and enforced a preventive maintenance program. No test of the cargo heating piping in cargo tank 1 had been made by the present owner/operator or present crew. A good preventive maintenance program could have detected the leaks in the vertical cargo heating piping in cargo tank 1 before the FIONA arrived in Northport. Although preventive maintenance may be considered a part of crew operations, frequent crew changes can disrupt the effectiveness of any crew maintenance program. The Safety Board believes that ship owners and operators need to develop preventive maintenance plans for use by vessel crews.

The International Convention for the Safety of Life at sea, 1974 requires all new tank vessels fitted with an inert gas system to have a closed ullage system. Had the FIONA been fitted with a closed ullage system, the temperature of the cargo in the cargo tanks could have been measured without having to introduce a temperature probe into the cargo tanks and the explosion probably would have been prevented. The Safety Board believes that all vessels with inert gas systems should have a closed ullage system.

When the FIONA was converted from an oil/bulk/ore (OBO) carrier to a tank vessel exclusively carrying petroleum products, heating coils were installed in the cargo tanks. Although the heating coils were fitted with thermal expansion bends near the bottom of the tanks, the vertical piping within the cargo tanks did not have provisions for thermal expansion. Therefore, the vertical pipes were susceptible to rupturing, especially at the brazed connections near the bottom end. The Safety Board did not identify any signs of external damage to the vertical piping of the cargo tank 1 and believes that the radial cracks found in the piping, which resulted in the static electrical steam cloud in cargo tank 1, were probably the result of thermal expansion and contraction.

Frequent crew changes dictate the need for ship operators to develop and implement standard safety operating procedures. The Safety Board believes that the operators of the FIONA should develop written procedures for the required testing of cargo tanks for explosive vapors, the use of the installed inert gas system, and safety precautions to be observed during sampling and measuring of petroleum cargoes.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Bedford Ship Management:

Require the use of installed inert gas systems whenever cargo tanks are not gas free. (Class II, Priority Action) (M-89-27)

Develop and implement a preventive maintenance program for all vessels. (Class II, Priority Action) (M-89-28)

Install closed ullage systems on all vessels with inert gas systems. (Class II, Priority Action) (M-89-29)

Provide for thermal expansion in the FIONA vertical cargo heating piping. (Class II, Priority Action) (M-89-30)

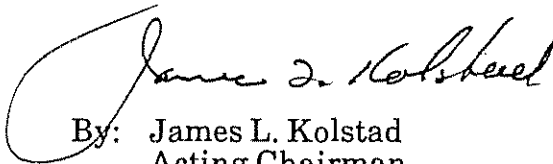
Examine the cargo heating piping on other vessels, and provide for thermal expansion as necessary. (Class II, Priority Action) (M-89-31)

Provide crews with written procedures including the testing of cargo tanks for explosive vapors, the use of the inert gas system, and the safety procedures to be observed during the sampling and measuring of cargoes. (Class II, Priority Action) (M-89-32)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "... to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally 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-89-27 through -32 in your reply.

Also, the Safety Board issued Safety Recommendations M-89-12 through -21 to the the U.S. Coast Guard; M-89-22 and -23 to the American Petroleum Institute; M-89-24 through -26 to the International Chamber of Shipping; M-89-33 through -35 to E. W. Saybolt, Inc., and SGS Control Services; M-89-36 and -37 to ERGON, Inc.; and M-89-38 to Underwriters Laboratories, Inc.

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.



By: James L. Kolstad
Acting Chairman