SP-20

National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation M-89-24 thru -26

Date: July 7, 1989

In reply refer to: M-89-24 through -26

Mr. J.C. S. Horrocks
Secretary-General
International Chamber of Shipping
3030/32 St. Mary Axe
London, England EC3A 8EJ

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]

As a result of its investigation, the Safety Board found that some Grade E cargoes can produce explosive vapors in vessel cargo tanks, and there is a need for vessel crews to determine whether cargo tanks contain explosive vapors before sampling or measuring cargoes. The FIONA was equipped with an operational combustible gas detecting device. It would have taken only a few minutes to determine whether the FIONA cargo tanks contained explosive vapors. Had the FIONA crew tested the cargo tanks, they would have found that all the tanks contained explosive vapors. The FIONA master could then have activated the inert gas system, vented the tanks, or taken other precautions which probably would have prevented the explosion in cargo tank 1.

According to the Third Edition of the International Safety Guide for Oil Tankers and Terminals (ISGOTT), safety precautions to protect against electrostatic hazards are not required when sampling or measuring residual oils, such as the No. 6 fuel oil carried aboard the FIONA. Thus, grounding the temperature probe used at the time of the explosion was not a safety practice recommended by ISGOTT. The Safety Board has found that some residual oils, including No. 6 fuel oils, can release light hydrocarbons and create an explosive mixture at temperatures below their flash point and that vessel crews should take precautions against electrostatic hazards when carrying residual fuels. The ISGOTT recommended precautions against electrostatic hazards are not complicated, time-consuming, or expensive; however, Table 7-1 in

[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).

ISGOTT is very complex for whether precautions against electrostatic hazards should be employed. The Board believes that the table should be eliminated and that vessel crews should be encouraged to always take precautions against electrostatic hazards in vessel cargo tanks regardless of the type of petroleum product carried.

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 contradictory regarding the operation of inert gas systems. Since the Safety Board has found 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 to maintain an inert atmosphere in cargo tanks unless the cargo tanks are gas free.

ISGOTT states, ". . . one way to provide protection against fire or explosion in the vapour space of cargo tanks is to keep the oxygen level below [11% by volume] . . . by using a fixed piping arrangement to blow inert gas into each cargo tank . . . . For practical purposes and to allow a safety margin, 8% is taken as the level of oxygen at which no hydrocarbon gas/air mixture can burn under any circumstances." The Safety Board interprets this recommended practice to mean that when a vessel has an inert gas system, it should be operated when the oxygen level in the tanks is 8 percent or more by volume, regardless of the grade of the petroleum product carried. However, the Board also believes that other interpretations could be made by vessel crews and that ISGOTT should be revised to clearly state that installed inert gas systems should be operated as necessary to maintain a nonexplosive atmosphere in cargo tanks unless the tanks are gas free.

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

Revise the "International Safety Guide for Oil Tankers & Terminals" to include a requirement that the atmosphere in cargo tanks carrying cargoes with a flash point above 140° F (closed cup test) should be tested and certified nonexplosive before sampling, or measuring cargo. (Class II, Priority Action) (M-89-24)

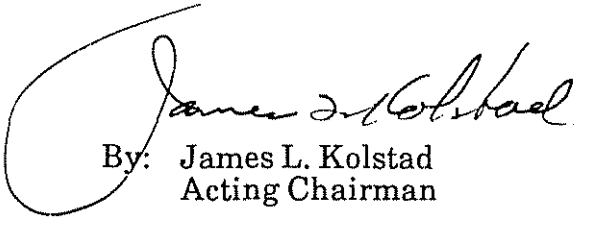
Revise the "International Safety Guide for Oil Tankers & Terminals" to include all petroleum products in the precautions regarding static electricity in vessel cargo tanks. (Class II, Priority Action) (M-89-25)

Revise the "International Safety Guide for Oil Tankers & Terminals" to clearly state that inert gas systems installed on tank vessels should be operated to maintain an inert atmosphere in cargo tanks when carrying petroleum products, unless the tanks are gas free. (Class II, Priority Action) (M-89-26)

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-89-24 through -26 in your reply.

Also, the Safety Board issued Safety Recommendations M-89-12 through -21 to the U.S. Coast Guard; M-89-22 and -23 to the American Petroleum Institute; M-89-27 through -32 to the Bedford Ship Management; 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