



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: JUL 17 1995

In Reply Refer To: M-95-24 and -25

Mr. George D. Miller, President
National Fire Protection Association
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About 0930 on July 24, 1994, while bound for Dutch Harbor, Alaska, in the Aleutian Chain, the U.S. fish processing vessel ALL ALASKAN caught fire near the western end of Unimak Island, Alaska. The fire burned out of control for several days before burning itself out. One person died, and the vessel and cargo damage was estimated between \$25.3 and \$31 million.¹ The National Transportation Safety Board determined that the probable cause of the fire aboard the ALL ALASKAN was the failure to isolate heat tape from combustible rigid polyurethane (RPU) insulation and the lack of heat tape standards for fish processing vessels. Contributing to the severity of the fire was the lack of adequate firefighting (detection and suppression systems) standards. Contributing to the loss of life was the lack of formal firefighting training of the fire team.

The U.S. Consumer Product Safety Commission studies on residential heat tapes concluded that a ground fault circuit interrupter (GFCI) provided reliable protection against fire from failed shielded heat tapes. The distribution circuits on marine vessels are generally designed to be ungrounded. On a steel-hulled ship that uses an ungrounded distribution system (no neutral conductor) a solid grounding of either heating tape conductor may not cause the circuit-over-current protecting device to disconnect and, ironically, is more likely if the electrical system is in good condition. However, should the system have poor electrical insulation or another accidental ground on the appropriate conductor anywhere in the ship, sufficient conductivity to the steel hull may exist for the over current device to disconnect the heating tape circuit.

¹For more detailed information, read Marine Accident Report--*Fire on board U.S. Fish Processing Vessel ALL ALASKAN near Unimak Island, Alaska, Bering Sea, July 24, 1994* (NTSB/MAR-95/02).

The installation of a GFCI to supply heating tapes with an ungrounded electrical system aboard a steel-hulled ship may or may not provide additional protection against fires. The following scenarios are possible:

a. If heating tape conductors do not touch ground and the arc does not result in sufficient current flow, a fire may start because the over-current protecting device may not disconnect. Additionally, the heating tape circuit supplied from a GFCI will not disconnect the circuit because a GFCI functions only when the protected circuit sustains a loss of current to ground.

b. If either heating tape conductor touches the hull, the results will resemble the scenario above, except if unintended electrical grounds already exist, the GFCI will cause an opening of the electric circuit at very low leakage currents. The GFCI to that extent may reduce the probability of fire incidence; however, it is not a predictably reliable protection from fires caused by heat tape failures.

A GFCI would, therefore, not be reliable in preventing a heat tape-initiated fire. Because no standards or regulations regarding the use of heat tape on vessels have been provided and fires aboard vessels using heat tape have occurred, the Safety Board concludes that a national marine safety standard for vessels on the safe use of heat tape is needed. Therefore, the Safety Board believes that the National Fire Protection Association (NFPA) and the U.S. Coast Guard should establish, in cooperation, a national marine safety standard on the safe use of heat tape, heat tape insulation, and methods to detect heat tape failure on vessels.

The Coast Guard Navigation and Vessel Inspection Circular (NVIC) No. 8-80 (Fire Hazard of Polyurethane and Other Organic Foams) states that when organic foam is exposed to fire or heat, it may ignite and burn with rapid flame spread, high temperatures, toxic gases, and voluminous quantities of smoke. When RPU foam insulation is properly installed and protected by a noncombustible material, according to NVIC No. 8-80, it is no more of a fire hazard than other combustible materials. This NVIC also provides guidance on the proper protection of RPU insulation.

The commercial uninspected fishing industry vessel regulations permit combustible insulation in cargo spaces and refrigerated service spaces and have no requirement about the type of foam (fire retarding or not) or other combustible insulation used in these spaces or how it should be installed and protected. The regulations do not specify smoke and fire detectors or fixed fire extinguishing systems for these spaces. No requirement stipulates what constitutes a proper installation for owners, inspectors, or accepted organizations to follow when a combustible material, such as RPU foam insulation, is used.

The Coast Guard NVIC No. 5-86 (Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels) recommends the use of smoke or fire detectors in galleys, accommodations, and other high fire risk spaces as well as the use of a fixed carbon dioxide fire

extinguishing system to protect cargo spaces with a high fire risk. However, what constitutes a high fire risk is not defined. The Safety Board has determined that large spaces insulated with RPU foam should be considered a high fire risk and that smoke or fire detectors should be used within these high fire risk spaces. The Coast Guard does require a fixed fire extinguishing system in cargo holds if the holds carry explosives, combustible liquids, or automobiles. However, it does not require this system be installed in the spaces insulated with combustible construction material in which people work at sea. These spaces should also be required to be protected by a fixed fire extinguishing system. The above items should be included in a national marine safety standard when combustible insulation material is used in cargo spaces.

After the Commercial Fishing Industry Vessel Safety Act of 1988 was enacted, the Coast Guard developed regulations for the fishing industry vessels. Despite the applicable details of NVICs No. 8-80 and No. 5-86 and the warnings in the 1990 Worcester [Massachusetts] Polytechnic Institute *Unclassed Fish Processing Vessel Study* concerning foam (combustible insulation) and its hazards, requirements were not incorporated into 46 Code of Federal Regulations part 28 when published on August 14, 1991. These regulations should have requirements about combustible insulating materials installation and protection in cargo holds and other service spaces.

The U.S. model building codes (shoreside) recognized and effectively dealt with the fire problem associated with cellular plastics almost 20 years ago. Unfortunately, this shoreside approach to fire safety has not been translated into fishing industry vessel fire safety codes and regulations. Should Coast Guard regulations continue to permit RPU foam or other organic combustible material insulations to be used in cargo holds and service spaces, the requirements for these combustible materials should be revised using the land-based fire protection standards to establish similar fire safety standards (construction and structural fire protection and fixed firefighting system) for fishing industry vessels. These requirements should include covering the combustible insulation with a noncombustible material, physically separating heat-taped equipment from combustible insulation with a noncombustible material/insulation, and installing smoke and fire detectors and a fixed fire extinguishing system in spaces equipped with these materials. The Safety Board concludes that a national marine fire safety standard for the safe use of RPU foam and other organic combustible material insulation on vessels is needed. Therefore, the Safety Board believes that the NFPA and the Coast Guard should establish, in cooperation, a national marine fire safety standard on the safe use of RPU foam and other organic combustible material insulation on vessels

Therefore, the National Transportation Safety Board recommends that the National Fire Protection Association:

Establish, in cooperation with the U.S. Coast Guard, a national marine safety standard on the safe use of heat tape, heat tape insulation, and methods to detect heat tape failure on vessels. (Class II, Priority Action)(M-95-24)

Establish, in cooperation with the U.S. Coast Guard, a national marine fire safety standard on the safe use of rigid polyurethane foam and other organic combustible material insulation on vessels. (Class II, Priority Action)(M-95-25)

Also, the Safety Board issued Safety Recommendations M-95-13 through -17 to the U.S. Coast Guard; M-95-18 through -22 to the All Alaskan Seafoods, Inc.; and M-95-23 to the Commercial Fishing Industry Vessel Safety Advisory Committee.

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-95-24 and -25 in your reply. If you need additional information, you may call (202) 382-6860.

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


By: Jim Hall
Chairman