



# National Transportation Safety Board

Washington, D. C. 20594

## Safety Recommendation

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**Date:** May 21, 1992

**In Reply Refer To:** M-92-31 through -37

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On March 22, 1990, the 162-foot-long U.S. fish processing vessel ALEUTIAN ENTERPRISE was trawling for fish in the Bering Sea. As a large net full of fish was hauled aboard, the vessel capsized and sank. Of the 31 persons on board when the accident occurred, 22 were rescued by nearby fishing vessels. Nine persons remain missing and are presumed to have drowned. The vessel was valued at \$6 million.<sup>1</sup>

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the fish processing vessel ALEUTIAN ENTERPRISE was the failure of the Arctic Alaska Fisheries Corporation (AAFC) to provide adequate crew training, operating procedures, maintenance, and safety oversight of its fish processing vessels and the imprudent decision, given the existing circumstances, of the master to continue hauling in the loaded net. Contributing to the accident and the loss of life were the AAFC's failure to provide adequate survival equipment and safety training and the Coast Guard's inadequate oversight of fishing vessel operations and safety.

While the last load of fish was being hauled aboard the ALEUTIAN ENTERPRISE, the net hauling equipment and the vessel were operating properly. Not until after the intermediate net section ripped open and the vessel listed to port did the master and some crewmembers realize that the vessel was in danger.

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<sup>1</sup>For more detailed information, read Marine Accident Report--"Capsizing and Sinking of the Fish Processing Vessel ALEUTIAN ENTERPRISE in the Bering Sea March 22, 1990." (NTSB/MAR-92/03).

Testimony revealed that the ALEUTIAN ENTERPRISE had a 3- to 4-degree list before the net codend was hauled up the stern ramp. When the master hauled the forward end of the intermediate net to the top of the stern ramp, the additional weight reduced the vessel's after freeboard. As he lifted the net above the lower trawl deck with the gilson winches, it shifted to the port side due to the initial port list. Raising the net also raised the vessel's vertical center of gravity, which reduced the vessel's stability and allowed heeling forces to increase the port list. According to the master, the port list was 10 to 15 degrees. At that point, the intermediate net ripped open, and the fish spilled out and accumulated on the after port side of the lower trawl deck. As a result, the combined heeling moments from the initial list and the off-center weight of fish caused the vessel to heel at an angle somewhere between 15 and 20 degrees, as observed by the master. The overall effect was to bring the vessel's after port side hull openings down close to the sea level.

The initial flooding of the processing area by water entering through the after port side hull openings increased the vessel's draft and after trim, further immersing the hull openings. Thus the vessel's stability was further reduced by the added weight of the flood water and the additional free-surface effect it created.

Despite the adverse list of the vessel, the master continued to haul the codend aboard until its forward end was at the top of the stern ramp. The master then requested the chief engineer to transfer fuel oil from port to starboard to reduce the port list. However, the engineer indicated that he had already started transferring fuel oil. Based on the simple routine nature of the fuel oil transfer procedure, it is reasonable to assume that the chief engineer had correctly set up the fuel oil transfer pump and valves and that the fuel was being transferred from the port to the starboard tank before the vessel capsized. If the chief engineer had had more than the estimated 5 to 10 minutes to transfer fuel, he might have removed enough of the port list to have raised the hull openings somewhat above the waterline.

However, the vessel capsized too rapidly for the chief engineer's efforts to be effective. It is unknown whether the engineer took any other actions and, if he did, whether he understood how they would affect the stability of the vessel.

The master had had no training in assessing vessel stability, nor was it required. Further, the AAFC did not have a program to train its masters in stability. Had the master received such training, he might have been more concerned about the condition of the hull openings and closures and about the impact that the flooding of the fish processing deck was having on the vessel's stability. Additionally, he might have been more concerned about the vessel's remaining watertight integrity, and he might have understood the effects of flooding through weathertight and watertight openings.

The Safety Board believes that the master made an imprudent decision when he continued to raise the loaded net after the ALEUTIAN ENTERPRISE had listed to port. Once the flooding occurred as a consequence of his actions, the capsizing could not be prevented. The Safety Board believes that had the master received formal vessel stability training, he would have been more conscious of the factors adversely affecting the vessel's stability. For many years the Safety Board has believed that all commercial fishing industry vessel masters and also engineers should be required to have vessel stability training.

The vice president of fishing operations reported that when he had been a master, he had checked his fish production against that of other vessels. If his vessel was not at or near the top in production, he tried harder during the next voyage. In his current position, he considered production his primary duty. He said that the AAFC was looking for masters who wanted to excel and make money and were willing to put pressure on themselves to perform. The consequences of this aggressive production approach were demonstrated when a previous master of the ALEUTIAN ENTERPRISE lost his job because of low production. In practice, fish production appears to have been the primary criterion for masters' evaluations.

The master of the ALEUTIAN ENTERPRISE at the time of the accident was considered very aggressive and was tasked to "turn this vessel and crew around." He had had limited experience being the master of a vessel this size. In this case, fish production appears to have been the main consideration of the vice president of fishing operations when he hired this master. The vice president did not give anyone else the safety responsibilities normally assigned to the master.

This accident illustrates the need for the AAFC to ensure that its masters know the importance of maintaining watertight and weathertight closures, understanding vessel stability, maintaining and stowing safety equipment, and providing emergency training. The Safety Board believes that the performance evaluation of a master should be based on his ability to operate a vessel safely as well as on his ability to increase fish production.

The ALEUTIAN ENTERPRISE flooded, capsized, and sank about 15 minutes after the intermediate net section ripped open. The closures were in such poor condition that any loading that brought the openings close to the sea surface increased the risk of flooding. Had the hull closures been properly maintained, flooding of the fish processing deck would have been reduced.

The processing area had several openings through which flooding water could enter contiguous compartments. At least one and possibly two watertight doors had been removed from the forward bulkhead of the processing area. Also, a watertight door at the top of the stairway that led from the passageway between the galley/dining area and the Baader room to the auxiliary machinery space was missing. Further, the door in the starboard engine room exhaust trunk was not watertight, allowing water to enter the engine room.

The Safety Board concludes that had the closures been properly maintained and the weathertight and watertight doors kept closed, the ALEUTIAN ENTERPRISE might not have flooded and capsized or it might not have capsized as quickly, thereby increasing the chances that the persons on board would survive. Additionally, had the crewmembers been instructed in the effects of flooding, they would have been aware of procedures to be taken to minimize flooding.

The Coast Guard's postaccident review of the second stability test and the revised trim and stability booklet revealed that the test had not followed all the guidelines from the NVIC 15-81 and that several mathematical errors had been made that rendered the vessel's lightship characteristics inaccurate. Consequently, the assumptions, calculations, and format of the booklet were deficient. The Safety Board concludes that because the booklet was based on an inaccurate stability test, it would have misled the master had he used it.

The information in a trim and stability booklet should be not only technically accurate, it should be presented in a way that allows crewmembers to use it routinely when they are loading cargo, ballasting, transferring fuel, or making any other changes that could affect the distribution of weights on board. The master of the ALEUTIAN ENTERPRISE, with his limited understanding of stability, found the booklet was *too difficult and complex to be useful*. Consequently, he did not refer to it.

The Safety Board believes that the format and technical level of a trim and stability booklet should be appropriate to the needs and capabilities of the users. The Safety Board concludes that the AAFC should review its vessels' trim and stability booklets and revise them as necessary to make them accurate and usable.

The ALEUTIAN ENTERPRISE was not maintained in a seaworthy condition as recommended by the Coast Guard's NVIC 5-86. The AAFC lacked an effective maintenance and repair program for hull opening closures and for weathertight and watertight doors. The Safety Board believes that had the vessel been subject to periodic inspection by the Coast Guard or another responsible entity, it would have been more seaworthy and the accident might have been averted.

The master and the crewmembers of the ALEUTIAN ENTERPRISE had little or no formal training in vessel safety, firefighting, the use of lifesaving equipment, survival procedures, or cold water survival. The proposed Coast Guard licensing plan could correct this lack of training aboard fishing vessels of less than 200 gross tons. Several crewmembers stated that they did not know enough about the on-board lifesaving and emergency equipment, such as where it was stowed or how it should be used. Although there were enough immersion suits for all the crewmembers, several survivors stated that they did not know where the suits were stowed or how to don them.

The Safety Board believes that crewmembers should be instructed when boarding a vessel about the location and proper use of safety equipment. Additionally, realistic drills should be conducted before a vessel leaves port and at regular intervals while it is at sea. A logbook of the drills should be maintained.

The ALEUTIAN ENTERPRISE carried videotapes about safety and survival at sea. Crewmembers could watch them only during their off-duty times, something they were reluctant to do because of their 16-hour workdays and 7-day workweeks, and they believed they were not required to watch them. Consequently, the videotapes were an ineffective method of on-board training.

The AAFC had encouraged crewmembers to attend safety training courses offered by the NPFVOA when they were first offered in 1986-87. However, course attendance declined during the 3 years before the accident. Training was also available from other outside organizations. Equipment supplier seminars were used to update a few engineers, but these training opportunities were limited and sporadic. The Safety Board attributes the decline in the AAFC's training program for crewmembers to the company's philosophy that crewmembers were expected to be fully qualified for their positions when hired. Had the AAFC more actively encouraged attendance and provided support, more crewmembers probably would have attended safety training courses.

The master attempted to sound the vessel's general alarm to alert the crew to abandon ship. However, because the alarm did not work, he ran below to alert the

crew, significantly increasing the time needed to let people know there was an emergency. The increase in time was critical because several crewmembers were sleeping, all needed to acquire and don immersion suits, and all needed to quickly exit the accommodations.

Since the master knew that the general alarm was broken, he should have had it fixed and tested before the vessel left port. The Final Rule requires a vessel to have a general alarm or alternative system. It also requires that the alarm or alternative system be tested before operating the vessel and at least once each week thereafter.

Persons on board must be quickly alerted to a danger so that they may take whatever precautions are necessary to save the vessel and themselves. Had the general alarm on the ALEUTIAN ENTERPRISE been sounded immediately at the time of the capsizing, the crewmembers sleeping below would have been awakened sooner and would have had more time to prepare to abandon the vessel, and more lives might have been saved.

When the vessel capsized, the fiberboard stowed in passageways fell and narrowed the walkway width in the passageways. Since the passageways were the primary escape route for persons in the processing area and engine room, the lashing and blocking of the door and the stowage of fiberboard in the passageways were dangerous practices that should not have been allowed. The Safety Board believes blocked passageways and the lashing and blocking of the upper trawl deck door impeded the rapid egress of persons from the compartments during the capsizing.

Even though there were enough immersion suits for everyone on board the ALEUTIAN ENTERPRISE, the suits were not easy to reach. At the time of the accident, most people were unable to get suits. Although about 3/4 of the people were on or below the lower trawl deck and exited through the door located forward of the net reels, 3/4 of the immersion suits were stowed above the lower trawl deck.

Had the immersion suits on the ALEUTIAN ENTERPRISE been stowed in areas normally occupied by the individuals who would use them in an emergency, more people would have been able to get the suits before entering the water.

Survivors stated that it was hard to get to the suits stored in the box on the lower trawl deck because equipment had been stowed on top of the box. The survivors who did get suits used valuable time searching for them and, consequently, did not have enough time to properly don the suits before they entered the water. Several survivors did not know where the suits were stowed. Had placards been posted showing suit stowage locations, more individuals may have known about the stowage.

Although instructions printed on the immersion suits recommended that the zippers be lubricated every 2 months, the zippers had not been waxed for about 6 months. A few survivors were unable to work the suit zippers. Since the postaccident inspection of the zippers did not find any corrosion, the lack of wax probably was the problem. Had the zippers been lubricated as recommended by the manufacturer, more people would have been able to properly don them.

When the ALEUTIAN ENTERPRISE capsized, the water was between 32 and 34° F. Although it is important that people not enter cold water without immersion suits, several crewmembers did not know how to don them. Instructions should be

posted that explain how to put on a suit. Crewmembers should be told how to don their suits when they are assigned to a vessel, before the vessel leaves port, and periodically while the vessel is at sea.

Several crewmembers stated that several persons had taken drugs and alcohol during the previous two voyages. Therefore, the AAFC's prohibition of drugs and alcohol, at least on board the ALEUTIAN ENTERPRISE, appears not to have been completely effective.

Therefore, the National Transportation Safety Board recommends that the Arctic Alaska Fisheries Corporation:

Inspect your vessels regularly to determine that hull closures and watertight doors are properly maintained and ensure that crewmembers are trained in how to use closures and doors to prevent and control flooding. (Class II, Priority Action) (M-92-31)

Spot inspect your vessels to ensure that your masters are inspecting and maintaining lifesaving equipment and are instructing their crewmembers in how to use lifesaving equipment, including how to don immersion suits; are conducting emergency drills at least once on each voyage; and are maintaining a log of these actions. (Class II, Priority Action)(M-92-32)

Review at least annually the trim and stability booklets on your vessels to ensure that they are accurate and can be used by the master for the operating condition of the vessel. (Class II, Priority Action) (M-92-33)

Develop and implement a performance evaluation system that addresses a master's ability to operate a vessel safely, as well as his ability to increase fish production. (Class II, Priority Action) (M-92-34)

Implement a vessel stability training program for your masters and engineers. (Class II, Priority Action) (M-92-35)

Prohibit the blocking or lashing closed of exit doors and the stowing of fiberboard or other obstructions in the passageways of your vessels. (Class II, Priority Action) (M-92-36)


Revise existing posted notices on your vessels concerning drug prohibition to include the company's prohibition of alcohol. (Class II, Priority Action) (M-92-37)

The Safety Board issued Safety Recommendations M-92-25 through -30, to the U.S. Coast Guard. The Safety Board also reiterated Safety Recommendations M-86-11, M-87-52, M-87-64, and M-88-31 issued to the U.S. Coast Guard:

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 R-92-31 through -37 in your reply.

COUGHLIN, Acting Chairman, and LAUBER, HART, HAMMERSCHMIDT, and KOLSTAD, Members, concurred in these recommendations.

  
By: Susan M. Coughlin  
Acting Chairman