

FACE-92-32

DATE: March 10, 1993

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: Commercial Fisherman Drowned After Fishing Vessel Capsized - Alaska

SUMMARY

A 16-year-old male commercial fisherman (the victim) became trapped and drowned after the commercial fishing vessel he was on capsized while under tow. The vessel (a bowpicker) had been disabled and anchored for 11 hours, with only the skipper and the victim on board. On the day of the incident, a tender came to tow the vessel back to port for repairs. Within 2 minutes of being taken in tow, the vessel capsized, trapping the skipper and the victim inside the pilot house. The skipper (a 20-year-old male) escaped and swam to safety. Several attempts were made to rescue the victim but none were successful. NIOSH researchers determined that to prevent similar occurrences, owners and/or skippers of commercial fishing vessels should:

- *obtain training in vessel stability, including factors that can lead to the deterioration of vessel stability and the measures that can be employed to maintain or restore stability, especially during towing operations*
- *ensure that a constant watch is maintained while under tow, both on the towed and assisting vessels*
- *ensure that all crew members wear a personal flotation device during a towing operation*
- *ensure that vessel preventive maintenance is performed and documented*
- *ensure that all non-essential personnel are removed from a vessel being towed.*

INTRODUCTION

On August 31, 1992, a 16-year-old male commercial fisherman (the victim) became trapped and drowned after the commercial fishing vessel he was on capsized while under tow. On September 2, 1992, the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), Alaska Activity (AA) learned of this incident via a newspaper article. On September 11, 1992, a safety specialist from the Alaska Activity traveled to the port nearest the incident site, and conducted an investigation. The safety specialist reviewed the incident with the skipper/owner of the towing (assisting) vessel, the skipper of the towed vessel, a Marine Safety Officer from the United States Coast Guard (USCG), and the local police officer assigned to the case. An autopsy report was obtained from the local coroner's office.

The victim had been self-employed as a commercial fisherman (share-holding crewman who receives a share of the catch profits) aboard the 32-foot fishing vessel, a bowpicker, for 5 weeks, and had previously fished commercially with his family for several years. The gasoline-powered vessel, built in 1974, had a fiberglass hull, displaced 10 gross tons, and had 4 feet of freeboard. The skipper had no written safety policy or established standard operating procedures. Safety issues were not discussed between the skipper and crew. At the time of the incident, the skipper and the victim were the only personnel aboard the vessel.

INVESTIGATION

The skipper and crewman had logged 5 weeks of experience on the vessel during the 1992 salmon season. They had been fishing for salmon for 1 1/2 days prior to this incident. During the morning on the day of the incident, the fishing vessel lost its steering ability. The skipper radioed a nearby tender for a tow and sat anchored for 11 hours until the tender arrived. At the time of the incident, the weather conditions were the following: 55 degrees Fahrenheit, 8 to 10 miles visibility, 25 to 30 knot SSE winds, water temperature 40 to 45 degrees Fahrenheit, with 3 to 4 foot seas.

The bowpicker (a gillnetter that retrieves nets from the bow as opposed to the stern of a vessel) was carrying a partial load of salmon and slush ice, weighing an estimated 1,000 pounds. The fish hold was not “topped off” with water; this results in a condition known as a “free-surface effect.” A free-surface effects describes the motion of a liquid in a partially filled tank or compartment. As a vessel rolls to one side, the liquid’s center of gravity shifts toward the low side. Consequently the vessel’s center of gravity rises on the high side and adds to the transverse heeling moment (the amount of time it takes the vessel to sway back into an upright position after being affected by a wave), which tends to roll the vessel further than if the tank or compartment had no free-surface (National Transportation Safety Board, 1991).

At 8 p.m. the tender, with a crew of five, arrived at the scene. The tender passed approximately 200 feet of 1-inch diameter nylon mooring rope to the bowpicker to serve as a towing line. The skippers discussed how to secure the tow line to the bowpicker. Both rejected the option of running the line through the scuppers (a drainage opening cut through the side of a ship, usually flush with the deck) and securing the end of the tow line to the deck cleats, because the deck cleats were deteriorating and the scuppers were raw fiberglass which could abrade the tow line. They decided to connect the line to the gillnet reel and then feed it over the bow rollers of the bowpicker (Figure 1).

Once the tow line was secured to the bowpicker, the tender started to tow in the direction of the waves and the line began to tighten. Prior to obtaining a taut line, the bowpicker slowly began quartering (moving through the water starboard bow side first) through the water. No one on the tender was conducting a tow watch; one individual was on board the tender, looking out the cabin window, but she was unable to observe the towing operation clearly.

Within approximately 2 minutes of being under tow, the skipper of the tender asked the bowpicker if everything was proceeding correctly; the bowpicker responded affirmatively. Then, before the end of the radio transmission, the skipper of the bowpicker screamed that they

were capsizing. The bowpicker had taken a wave over the starboard bow, resulting in a starboard list. The water on the deck could not drain completely through the scuppers because they were below the water line. As a result of the list and the excessive water on deck, the towline slipped off the bow roller. The next two waves were taken over the starboard bow, capsizing the vessel. The skipper reached for his survival suit but only managed to touch it before he was thrown backwards as the vessel capsized.

Water poured through the door of the pilot house as the vessel capsized, with the skipper and the victim trapped inside. The skipper later reported that there was a small pocket of air in the pilot house. The skipper pushed debris aside and swam through the opening of the pilot house door. He surfaced, climbed onto the keel, and immediately saw that the victim had not surfaced. The victim had last been seen standing by the pilot house door, at the time the vessel capsized.

The tender immediately stopped and turned around to help. The tender crew donned survival suits and, along with the bowpicker skipper, made several rescue attempts trying to break the pilot house windows in an attempt to reach the victim. The skipper was then taken aboard the tender. Rescuers reported that they could hear the victim banging on the hull for about 30 minutes, but they became exhausted from fighting the current, and were not able to reach him.

During these initial rescue operations, the tender sent a Mayday requesting immediate assistance. The USCG responded, stating a helicopter was enroute, but later reported that it had to turn back due to poor weather conditions. Two other vessels in the vicinity arrived on the scene, with two men who had diving equipment. Within an hour the divers made several unsuccessful rescue attempts and decided not to try again due to poor weather, diminishing day-light and reduced visibility, lack of diving experience, and fear of getting tangled in the gear that was cluttered around the door. A nearby cruise ship offered medical personnel and transported their doctor to the tender in case the victim was recovered. The cruise ship also positioned itself near the capsized vessel in an attempt to break up the force of the seas against the vessel.

The tender tried to right the capsized vessel with its deck crane. The vessel was lifted enough to partially expose the cabin door, which was moving with the swell and was not jammed. Several gillnet vessels attempted to shine their searchlights at the doorway to see if a body could be seen. After several minutes, the line on the tender's deck crane parted and the vessel fell back into the water. At this point, there had been no indication of activity reported from the trapped victim for well over an hour and a judgement was made that the body could not be retrieved without professional divers.

The Alaska State Troopers' dive team arrived the next morning and recovered the body from the overturned vessel. The divers reported there was considerable debris, including fishing lines, both on the vessel and around the 18" cabin doorway. With such a narrow opening, it was difficult for the divers to fit through; one was wearing SCUBA and the other was using supplied air-line diving gear. The victim was found near the door, facing the stern. The body had to be untangled from lines in order to be recovered.

The vessel was taken to its home port and was righted under the direction of the harbor master.

CAUSE OF DEATH

The autopsy reported that the victim died as a result of hypothermia/cold water drowning.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Owners/skippers of commercial fishing vessels should obtain training in vessel stability, including factors that can lead to the deterioration of stability and the measures that can be employed to maintain or restore stability, especially during towing operations.

Discussion: One stability factor in this incident was that the fish hold of the bowpicker was partially loaded with an estimated 1,000 pounds of salmon and slush ice. However, this hold was not “topped off,” causing a free-surface effect that may have contributed to the capsizing of the bowpicker. As defined earlier, free-surface effect describes the motion of a liquid in a partially filled tank or compartment.

Another factor affecting vessel stability in this incident was the point at which the tow line was attached to the bowpicker. A bowpicker is built in such a way that when it is in transit the bow is positioned several feet higher than the stern. However, when it is in a resting position, the bow is positioned lower, with only 4 feet of freeboard. It is therefore, imperative when the vessel is being towed, that the attachment point be as low and as close to the centerline of the towed vessel as possible, to approximate the normal running presentation of the bow to the water. The tow line, in this instance, was attached to the gillnet reel and then lead over the bow rollers (Figure 1). This attachment point was too high and too far back for this type of vessel. A more appropriate way of securing the tow line would have involved threading the line through the scuppers and then attaching it to the deck cleats. However, the skippers on both vessels were not comfortable with this arrangement because of the condition of the deck cleats and scuppers. The cleats were very worn and weathered and the scuppers were raw fiberglass, which they felt would cut the tow line. Bowpickers now being built are equipped with an eyelet low on the bow for towing purposes.

Individuals on both vessels were unaware of the possible stability problems of attaching the tow line too high and too far back on the bowpicker. Other instances of near capsizings of bowpickers under tow have been reported to the USCG, although none have resulted in a fatality.

According to the Vessel Safety Manual (North Pacific Fishing Vessel Owners’ Association Vessel Safety Manual) distributed by the North Pacific Fishing Vessel Owners’ Association, when preparing to tow another vessel, one should keep in mind that everything must be done slowly and cautiously. The tow will greatly affect the safety and stability of the vessel in numerous ways, and each situation is different. One should ensure that the vessel being taken in tow has been secured by ensuring watertight integrity, securing heavy objects and moveable cargo, eliminating free-surface and other threats to stability, and pumping bilges.

One potential solution to the problem of the free-surface effect would be to insert bin boards into fish holds. Bin boards limit both the mass of water and the distance of movement of liquid,

thereby decreasing the free-surface effect. Free surface effect is measured by cubing the width of a container or hold. For example, in Figure 2, if vessel A's fish hold width is 9 feet, then the free-surface effect is 729 cubic feet (9 by 9 by 9). But when two bin boards are inserted in vessel B to create three separate fish holds, the free surface effect for each hold is 27 cubic feet (3 by 3 by 3) and a total of 81 cubic feet for the three holds. The addition of the bin boards reduces the free surface effect by 89% (Alaska Marine Safety Education Association [1993]).

According to a National Research Council study entitled Fishing Vessel Safety - Blueprint for a National Program (National Research Council [1991]), approximately 70 percent of deaths involving commercial fishing vessels are related to vessel stability. The lack of watertight integrity, uncontrolled free-surface of liquids, and excessive trim (horizontal position of vessel) were mentioned as negatively affecting a vessel's transverse stability (the tendency of a vessel to return to the normal upright position when heeled by such external forces as wind and waves).

Courses, books, and videotapes are available through a number of institutions to provide training in the area of vessel stability.

Recommendation #2: Owners/skippers of commercial fishing vessels should ensure that a constant watch is maintained while under tow, both on the towed and assisting vessels.

Discussion: When one vessel is towing another, there should be at least one person on the towing vessel designated to identify potential problems (should they arise) during the towing procedure. This individual should be located on the stern but out of line from possible recoil if the tow line parts. The most critical phase of a towing operation is when the line is becoming taut (Boat Crew Seamanship Manual, USCG). Additionally, an individual on the towed vessel should have similar safety responsibilities.

Recommendation #3: Owners/skippers of commercial fishing vessels should ensure that all crew members wear a personal flotation device (PFD) during a towing operation.

Discussion: The USCG recommends that each individual on board a towed vessel don a PFD. Towing is a potentially dangerous procedure, which is often compounded by poor weather conditions and the crossing of rough water (Boat Crew Seamanship Manual, USCG). It is important for all personnel to wear a PFD in case of sudden capsizing and/or ejection into the water.

Recommendation #4: Owners/skippers of commercial fishing vessels should ensure that vessel preventive maintenance is performed and documented.

Discussion: In this incident the bowpicker had lost its steering ability. If vessels undergo proper preventive maintenance, the situation of requiring a tow due to mechanical breakdown is minimized. Also, carrying basic spare parts necessary to effect routine minor repairs at sea can minimize the need for assistance and towing.

The skippers on both vessels did not trust the deck cleats as a connecting point for the towing operation. The procedure of looping through the scuppers and attaching to the deck cleats would

have provided a much better connection point for the towing operation. This was not possible because the deck cleats and scuppers had not been maintained in adequate condition.

Recommendation #5: Owners and/or skippers of commercial fishing vessels should ensure that all non-essential personnel are removed from a vessel being towed.

Discussion: The safety of personnel is of utmost importance during a towing operation with property being a secondary concern. The USCG Boat Crew Seamanship Manual lists several precautions to take during towing operations including the removal of non-essential personnel from the disabled vessel.

In 1991, NTSB investigated an incident involving a disabled fishing vessel which capsized while being towed across a sandbar by the USCG. Three of the seven on board the towed vessel drowned. NTSB stated in their report that contributing to the loss of life was the failure to remove all unnecessary personnel from the fishing vessel prior to attempting to cross the sandbar (National Transportation Safety Board, 1991).

In this incident, an argument can be made that both individuals on board the vessel were essential. However, in an instance where there is a larger crew on board a disabled vessel, the non-essential personnel, those not conducting a tow watch or steering the vessel, should be removed for their own safety.

REFERENCES

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Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study: Alaska, Georgia, Indiana, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

Additional information regarding this report is available from:

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