

MARINE OCCURRENCE REPORT

M98F0009

CAPSIZING

FISHING VESSEL "TWIN J."

IN THE PACIFIC OCEAN

29 APRIL 1998

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Marine Occurrence Report

Capsizing

Fishing Vessel "TWIN J."
in the Pacific Ocean
29 April 1998

Report Number M98F0009

Summary

On 29 April 1998, the "TWIN J.", on a voyage from Newport, Oregon, to Midway fishing grounds, was approximately 850 nautical miles northeast of Hawaii when a large wave was shipped that listed the vessel heavily to port. Before the vessel recovered, another steep wave struck the "TWIN J." and caused it to capsize to starboard. The crew was thrown into the water but soon boarded a self-inflated liferaft. Some 6 hours later the raft was located by a United States Coast Guard rescue plane. The survivors were rescued by a United States fishing vessel approximately 12 hours after the capsizing. No injuries or pollution were reported as a result of the accident.

Other Factual Information

Particulars of the Vessel

	"TWIN J."
Port of Registry	Victoria, British Columbia (B.C.)
Flag	Canada
Registry/Licence Number	347783
Type	Fishing Vessel
Gross Tons	52.52
Length	18 m
Built	1973 at Victoria, B.C.
Propulsion	One diesel, 230 bhp (brake horsepower)
Number of Crew	3
Registered Owner	Redep Investment Inc., Vancouver, British Columbia

The "TWIN J." was a steel-hulled vessel of closed construction built to be used as a dragger, long-liner or packer. According to the existing stability book, the "TWIN J." had five underdeck tanks with a total capacity of approximately 4,520 imperial gallons (20,548 litres). Two oil fuel tanks were in the engine room and had a combined capacity of 3,000 gallons (13,638 litres). Two fuel tanks were in the after part of the hull and had a combined reported capacity of 520 gallons (2,364 litres). One tank was in the bow and had a capacity of 1,000 gallons (4,546 litres). The bow tank, originally designated for fresh water, was used to carry fuel oil, while one small tank of approximately 59.8 gallons (272 litres) capacity was placed on top of the wheel-house and used for fresh water.

The owner bought and modified the vessel in 1996 to fish for tuna in the remote fishing grounds in the Pacific Ocean. Four additional fuel tanks of a combined capacity of approximately 2,800 gallons (12,729 litres) were installed on deck. The owner also reported that the underdeck aft fuel tanks were larger than shown in the vessel's stability book. Their actual total capacity was approximately 560 gallons (2546 litres).

The "TWIN J." thus could carry approximately 7,360 gallons (33,459 litres) of diesel oil. The estimated fuel consumption per day was about 100 gallons (455 litres) when steaming and 65 gallons (295 litres) when fishing. The extra fuel tank capacity would allow the vessel to accomplish the trip from Vancouver Island to Midway fishing grounds, in position lat. 030° N, long. 178° W, approximately 3,000 nautical miles, and fish for approximately 45 days without re-fuelling.

A copy of the stability booklet for the "TWIN J." with a Department of Transport (DOT) approval dated 22 October 1981, was found in the Transport Canada Marine Safety (TCMS) office in Vancouver. It showed only

the two fuel tanks in the engine room and the fresh water tank in the bow. A note in the book explicitly prohibited the use of the aft fuel tanks, stating that all reference to aft fuel tanks had been removed since they shall be kept empty and permanently capped off.

The booklet includes stability calculations for five typical loading conditions all of which met or slightly exceeded the TC accepted minimum criteria.

A Marine Safety surveyor inspected the "TWIN J." and issued an SIC 29 certificate on 27 February 1998. The certificate was valid for foreign voyages until 28 February 2002. Being a fishing vessel of less than 150 gross register tons (GRT) built before 6 July 1977 and not catching herring or capelin, the "TWIN J." was not required to comply with the intact stability requirements of Section 29 of Part 1 of the *Small Fishing Vessel Inspection Regulations*.

Consequently, the surveyor did not ask to see a stability booklet and so was not aware of the restriction concerning the aft fuel tanks. At the time of the inspection there were no additional fuel tanks on deck. Reportedly they were being serviced ashore and the owner replaced them on board just prior to departure from Port Alberni.

Following an investigation into the sinking of the "LE BOUT DE LIGNE", 13 December 1990 (TSB Report No. M90L3033), the TSB made several recommendations concerning small fishing vessel stability. The Board recommended that:

The Department of Transport develop and validate more appropriate stability criteria for small fishing vessels which take into account their characteristics and trade, and the conditions in which they operate.

(M94-30, issued August 1994)

In their response, TCMS indicated that the *Small Fishing Vessel Inspection Regulations* were being replaced with new regulations that would require stability booklets for all fishing vessels 15 metres in length and over. To date no such changes to the Regulations have been implemented.

The Board further recommended that:

The Department of Transport emphasize, through a safety awareness program for owners, operators and officers of fishing vessels, the adverse effects of structural modifications and additional items on vessel stability.

(M94-31, issued August 1994)

In its response, TC indicated that the Canadian Coast Guard would emphasize the adverse effects that some structural modifications and addition of items may have on vessel stability. This was to have been carried out through the issuance of a Ship Safety Bulletin (SSB) and amendments to the *Small Fishing Vessel Safety Manual* (TP 10038). A SSB (16/96) was issued by TC and a brochure was published by the Canadian Coast Guard Office of Boating Safety further emphasizing concerns regarding stability on small fishing vessels.

Two inflatable four-person rafts were on board the "TWIN J.", both secured to the deck on top of the wheel-house. The rafts were lashed to the deck with bungy cords and not fitted with hydrostatic release devices or another float-free arrangement.

One raft was of a type approved by TC, with a double floor, a double canopy and a class "A" survival pack. The raft was in a cylindrical container and stowed on the port side. The other raft, non-approved and commonly referred to as a minor-waters raft, had a single bottom and a single canopy. This raft was in a flat, rectangular container stowed on the starboard side. Upon the owner's request the non-approved raft was also equipped with the class "A" survival pack. Two thermal protective aids (TPAs), although not required by the Canadian regulations, were also added to each raft.

The "TWIN J." left Port Alberni, B.C., on 15 April 1998, bound for Newport, Oregon, where the skipper intended to replenish the fuel and provisions. On 19 April at 1530¹ the vessel left Newport, and headed towards the Midway fishing grounds. Reportedly, all fuel tanks were full upon departure and the fuel system was set to obtain fuel consumption from the engine-room tanks. The fresh water in the small tank was continuously replenished by a water maker.

Post-occurrence stability calculations for the reported departure condition, based on the weights declared by the skipper, indicate that the vessel's characteristics were significantly below the TC minimum stability criteria.

The weather on departure and during the first four days of sailing was clear with southwesterly winds of 10 to 15 knots. The crew of three, including the skipper, kept one-person wheel-house watches of 6 hours, which were followed by 12 hours of rest. The vessel was, reportedly, handling well, heading in the direction of 245° true (T) approximately. The engine was running at 1,200 rpm, giving a speed of six knots.

On April 24 the wind shifted to the north and increased to 25 to 30 knots, causing moderate sea conditions. The course was changed to 230° T. Two days later the crew observed the wind speed increase to over 40 knots and the sea surface become moderate to rough. For steadier shipboard conditions, course was changed to 190° T.

On April 27, after a brief stop for regular engine maintenance, the voyage was continued. To minimize the deviation from the planned route, the vessel was now steered on a course of 230 to 240° T and, although the rpm was reduced to 1,000, the speed remained at approximately six knots.

In the morning of April 28 the northerly wind increased to 45 to 50 knots with frequent gusts. The sea was building up. Reportedly, with the rough sea from the starboard quarter, the vessel was handling well. A copy of the weather facsimile received on board indicated that a low pressure system had formed north of Hawaii. The "TWIN J." was north of the centre of the depression.

On April 29 at 0600 the wheel-house watch changed, and the deck-hands relieved each other while the skipper remained in his bunk. At 0620 the skipper was awakened by a crashing noise and violent shuddering of the vessel. He immediately went to the wheel-house and observed that the deck was completely covered by sea water and the vessel listed heavily to the port side. Reportedly, a large irregular wave from the starboard quarter had been shipped, suddenly flooding the deck up to the level of the bulwark rail.

¹

All times are PST (coordinated universal time minus eight hours) unless otherwise noted.

The skipper pulled back the throttle to neutral and then pushed to full ahead, however these manoeuvres did not significantly change the situation of the "TWIN J.". Most of the shipped water was retained and the deck was still awash when another large wave struck and broke the wheel-house window. The vessel then started rolling over to starboard.

The skipper alerted the off-watch deckhand via the intercom, and activated the digital selective calling (DSC) alarm feature of the vessel's VHF. The three crew members helped each other abandon the vessel. An attempt to manually inflate the raft in the cylindrical container failed when the raft, untied from its cradle, was dropped and fell between the superstructure and bulwark. The second raft remained secured to the deck when the vessel began rolling over. All three crew members were thrown into the water and drifted away from the overturned vessel. They had no time to activate the signalling flares available and none wore a flotation device.

They began swimming back towards the overturned vessel when an inflated raft was spotted next to it. Helping each other, they boarded the raft and cut the painter to free the raft from the vessel. In the raft they found the two TPAs, a knife, and a survival pack. The raft was not fitted with an interior light and the flashlight found in the pack was not working.

The raft had a single bottom and a single layer canopy. With a sea anchor deployed on the side opposite to the door, it was drifting with the wind—approximately southwest. After a short while the raft started leaking water. The patching kit found in the survival pack could not be used because the glue would adhere to a dry and clean surface only. The occupants scooped the water using a bailer and a sponge. To dispose of the water the entrance had to be partially open.

Similarly, for lookout purposes, the entrance had to be kept partially open because the canopy was not fitted with another opening. The outside cool air was thus let into the raft and the temperature inside was low. Reportedly, the water temperature was approximately 14°C and the air approximately 17°C. The three survivors took turns at wearing the two TPAs.

At 0701 a radio signal from an emergency position indicating radio beacon (EPIRB), which had floated free from the "TWIN J.", was intercepted by a satellite. The signal was relayed to the Rescue Coordination Centre (RCC) in Victoria, B.C. The signal included the vessel's identification number but not the position. The RCC began a telephone search for the owner to establish the vessel's whereabouts.

At 0746 it was determined that the EPIRB signal was coming from a rectangular area of approximately 750 x 150 miles, some 900 miles north of Hawaii. The United States Coast Guard (USCG) was notified. At 0817 the RCC, through the owner's relatives, established that the "TWIN J." was on a voyage to the Midway fishing grounds. Radio contact was established with the United States fishing vessel "VERA CRUZ", which was in the area and had seen the "TWIN J." some eight hours earlier. This information contributed to a more accurate estimate of the position of the "TWIN J.".

At 1316 a fixed-wing aircraft of the USCG found the drifting raft and dropped a pack containing a two-way radio and some survival gear. At 1438 radio communication between the aircraft and the raft was established and the skipper apprised the aircraft crew of the circumstances of the accident and of the condition of the survivors. The "VERA CRUZ" was directed towards the position of the raft. When the "VERA CRUZ" was proceeding to the indicated position, her crew saw the overturned "TWIN J.". At approximately 1900 the "VERA CRUZ" approached the raft and took the survivors on board.

At 1927, RCC Honolulu was informed that the survivors were recovered from the raft and they were in good condition on board the "VERA CRUZ" en route to Honolulu. The raft was not recovered by the rescuers.

The skipper of the "TWIN J." had sailed for approximately 35 years on various vessels, of which approximately 20 years was on fishing vessels, including tuna boats. He holds a Master Minor Waters Certificate of Competency, which he obtained in 1971 after passing two exams: Chartwork and Ship's Business.

The two deckhands had some sea-going experience and knowledge of steering of the vessel but neither had received formal training or possessed a marine certificate of competency.

The *Crewing Regulations* made pursuant to the *Canada Shipping Act* exempts the skippers and crews of Canadian fishing vessels of up to 85 GRT from the requirement to hold a marine certificate.

The "TWIN J." was inspected according to the CSA and its regulations respecting the construction and inspection of fishing vessels not exceeding 24.4m in length. The part of these regulations that refers to the vessel's stability does not apply if the inspected vessel is not employed in catching herring or capelin.

The life saving equipment provisions of the *Small Fishing Vessel Inspection Regulations* that applied to the "TWIN J." require that a fishing vessel be equipped with lifejackets and liferafts but do not require a self-release mechanism for the liferafts. One of the schedules of the regulations lists the equipment that should be carried in the raft, known as Class "A" pack. Neither TPAs nor smoke signals are included in the list.

The two self-inflatable rafts were inspected and serviced by an accredited servicing depot two months before the occurrence. The mandatory and TC-approved raft was fitted with a Class "A" pack as required by the regulations. The non-approved raft was also fitted with a Class "A" pack as requested by the owner.

Attempts to locate the vessel's original plans and documentation, and hence verify its particulars and stability data, were unsuccessful. The builder and the naval architects shown in the existing stability book are no longer in business. Reportedly, any documentation concerning the "TWIN J.", if it existed, was lost two years previously during a fire in a private office in Vancouver that held some old ships' files.

Analysis

Because fish stocks in the coastal waters of British Columbia are dwindling, fishermen are going further offshore to deep-sea fishing grounds. The good catches obtained have made this practice a growing trend. Consequently, there are more fishermen who, like the owner of the "TWIN J.", have converted and modified their vessels to make longer trips and fish for new species.

The amendments to the *Small Fishing Vessel Inspection Regulations* planned in 1994, which would have required stability booklets for all fishing vessels over 15 m, have not yet been implemented. The existing regulations do not prevent owners from converting their vessels according to their own requirements. Such modifications are often not brought to the attention of the authorities, nor subjected to inspection or approval, even though they are required to be reported to TCMS.

Depending on the owner's knowledge and thoroughness, the conversion could include fishing gear modification and the installation of a long-range communication device. To make the longer trips feasible, the conversion would also include a modern (global positioning) navigational system and an increase of the vessel's fuel-carrying capacity.

When the owner bought the "TWIN J." in 1996, he was planning to use it for long-range fishing trips. He assessed the vessel according to his commercial plans; however, the examination did not include the vessel's stability characteristics.

Had he examined the vessel's stability booklet he would have found the restriction on the use of two aft tanks. He would also have found that on departure, with her holds empty and the original approved fuel and fresh water tanks full, the vessel barely met TC minimum stability criteria. In view of his intention to install additional oil fuel tanks above the main deck, it would have been prudent to have had the converted vessel's stability characteristics reviewed by a competent person.

Such lack of knowledge of basic ship's stability may be explained by an insufficient and outdated training. When he obtained his certificate 25 years ago, the skipper did not have to undergo any formal training nor was he required to demonstrate any knowledge of ship's stability.

The Marine Safety surveyor did not inquire about the vessel's stability data when issuing the Safety Inspection Certificate two months before the occurrence, nor was he required to do so, because the vessel was not going to fish for herring or capelin. The surveyor was adhering to Canadian regulations, made pursuant to the *Canada Shipping Act*.

The four extra fuel tanks added on deck were above the vessel's centre of gravity. This positioning further decreased the already limited transverse stability. On departure from Newport, Oregon, all oil fuel tanks were full, including the two aft tanks and the four additional tanks on deck. The vessel then barely complied with TC initial stability requirements, but all her righting lever and dynamic stability characteristics were markedly below the accepted minimum criteria. The consumption of fuel from underdeck tanks, while the tanks on deck were kept full, further reduced the stability. Consequently, at the time of the capsizing the transverse stability of the "TWIN J." would have been even worse than it had been upon departure.

The liferafts were not fitted with hydrostatic release mechanisms nor were such devices required by the regulations. It appears that the one that inflated was the non-approved, single-bottom raft stowed on the starboard side in a flat rectangular container. It is most likely that the bungy cord used to lash it to the deck was weak and that it parted when the vessel rolled over.

The port side raft, mandatory and approved by the TCMS rules, was inadvertently lost when the crew attempted to launch it manually. Most probably, it wedged itself between the vessel's rigging and, in spite of its positive buoyancy, remained under water with the vessel.

The raft that inflated was not the mandatory one. Because the owner had requested that the survival pack be placed in the raft, the survivors had at least two TPAs, some food, water and other equipment; but the flashlight and the repair kit were unusable. The raft's bottom was leaking but the occupants could not patch the hole as the glue in the kit could not be applied to a wet surface and the conical plugs and clamping devices normally contained in a Class A pack were not used.

In order to maintain a lookout and remove the excess water with a bailer, the occupants had to partly open the entrance closure. This allowed an ingress of cooler air into the raft. Normally, a liferaft capable of accommodating six or fewer persons should have one ventilation opening.

The efficient and timely search and rescue (SAR) operation by both the Canadian and the United States units was initiated immediately after the first EPIRB signal was relayed by a satellite. The operation allowed the rescuers to locate the drifting raft and to rescue the survivors before hypothermia or the other perils of the ocean overpowered them.

SAR response was rapid and professional. This, coupled with the fact that there was an extra raft carried on board the vessel and two thermal suits were available, increased the chance of survival.

The vessel and its equipment fully complied with the Canadian regulations which allow a fishing vessel such as the "TWIN J." to be manned by non-certificated personnel and to sail approximately 3,000 miles from the Canadian coastline. Current inspection regulations did not require that the vessel's stability be verified prior to this voyage. Further, Canadian regulations do not prohibit this size of vessel from having liferafts lashed to the deck despite the fact that this may lessen the chance that they will float free if the vessel sinks.

Findings

1. The fishing vessel "TWIN J." shipped water on deck from two successive large waves coming over the starboard quarter.
2. The vessel listed to port with its deck awash with retained seawater, and then capsized to starboard when struck by a second wave.
3. The transverse stability of the vessel was markedly reduced by the weight of additional tanks and oil fuel located above the main deck.
4. Contrary to regulatory requirement, the installation of additional oil fuel tanks above the main deck was not brought to the attention of the safety inspector when the latest SIC 29 was issued.
5. The detrimental effects on the vessel's stability and the additional weight of fuel tanks was not reviewed by a competent person during the conversion.
6. Two inflatable rafts were firmly lashed to the upper deck. No hydrostatic release was fitted.
7. The only TC-approved raft was lost when the crew attempted to launch it.
8. No member of the crew wore a lifejacket or personal floatation device when abandoning the vessel.
9. The second raft parted its lashing and self-inflated when the vessel rolled over.
10. The carriage of a second raft as well as its equipment, including the two thermal suits, was not mandatory but had been provided by the owner.
11. In Canada, there is no regulatory requirement for the skipper or the crew of a fishing vessel up to 85 GRT to undergo formal training, including Marine Emergency Duties training.
12. The safety equipment in the non-approved raft did not include smoke signals, nor were they required by regulations.
13. The survivors were unable to effect repairs to the liferaft because the glue provided with the patching kit did not work on a wet surface and they did not use conical plugs or clamping devices normally carried in a Class A pack.

Causes and Contributing Factors

The "TWIN J." capsized because two large and successive waves were shipped and retained on deck. She was unable to recover due to her stability characteristics, which had been adversely affected by the addition of unapproved fuel tanks above the main deck prior to the voyage. Such adverse effect was exacerbated by the fact that the fuel carried on deck was not consumed first. Due to her size and the type of fishing in which she was engaged, the stability characteristics of the "TWIN J." were not subject to TC approval. The owner/operator did not have sufficient knowledge of stability to understand the detrimental effect of the modifications made to his vessel.

The SAR operation was initiated after a radio signal was received from the vessel's EPIRB. The crew was rescued after they boarded a non-approved, defective liferaft.

Safety Action

Action Taken

The safety of small fishing vessels has been a long standing issue in Canada. Due to safety concerns about the level of safety in the fishing industry and, in particular, aboard small fishing vessels, in December 1998 TCMS instituted a Small Fishing Vessel Safety Working Group to review the May 1993 Draft of the *Small Fishing Vessel Safety Regulations*.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 23 June 1999.