

MARINE OCCURRENCE REPORT

SINKING

OF THE SMALL YARDING TUG "WOLCO VI"
KWATNA INLET, BRITISH COLUMBIA
18 FEBRUARY 1996

REPORT NUMBER M96W0025

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.

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SUMMARY

While engaged in forestry operations off the Odyssey Camp, the small yarding tug "WOLCO VI" took on water, heeled heavily to port, downflooded, and sank when the tug operator tried to haul a heavy granite (stone) anchor along the sea-bed. The operator became trapped inside the tug and lost his life, but the deck-hand managed to escape. He radioed for help on his portable radiotelephone and was rescued shortly thereafter by the logging camp helicopter that responded to the call.

Ce rapport est également disponible en français.

OTHER FACTUAL INFORMATION

Particulars of the Vessel

Name	"WOLCO VI"
Port of Registry	Vancouver, B.C.
Flag	Canada
Official Number	331293
Type	Yarding tug
Gross Tonnage	9
Crew	2
Length	7.8 m
Built	1969, New Westminster, B.C.
Propulsion	One two-stroke diesel engine, 230 BHP, driving a single fixed-pitch propeller housed in a Kort nozzle
Owners	Helifor Industries Ltd., Vancouver, B.C.

The "WOLCO VI" is a small steel yarding tug of carvel construction with a plumb stem and a rounded transom stern. There is a small aluminium cabin (wheel-house) located amidship with a command bridge atop. A dinette is located to the port of the steering console (helm) in the cabin, with a galley to starboard of it. A narrow door on the forward bulkhead of the cabin, to starboard of the centre-line helm, leads to the forecabin area. The wheel-house can be accessed from a rear sliding door and from a hinged door on the starboard side.

The wheel-house has basic equipment comprising a radar, an echo-sounder and a very high frequency radiotelephone (VHF R/T). The echo-sounder was known to have been defective and non-operational for a period of time, and this information had been brought to the attention of the company during safety meetings.

The "WOLCO VI" was employed at the Odyssey Camp located in Kwatna Inlet, one of the three helicopter logging camps operated by HELIFOR, a subsidiary of International Forest Products (INTERFOR).

The boom-man/tug operator (hereinafter referred to as the operator) had 17 years' experience as a small boat operator. For the last three years, he had been working for this company in logging operations which involved operating the "WOLCO VI". He had no formal training, nor was he required to have any by regulations, to operate a tug of this size and type. At the time of the accident, he was in charge of, and engaged in, reinforcing the holding pen, where the logs are held after sorting. The water drop zone, where the logs are dropped by helicopter, had already been constructed.

The drop zone and the holding pen were adjacent to each other. These pre-selected areas in the water were enclosed by connected logs. On the inshore side, the corners were held in place by cables secured to the shore. On the offshore side, a 213 m galvanized steel wire cable connected each of the boom stick markers to its respective heavy granite anchor on the sea-bed.

The operator wanted to attach an additional granite anchor to the centre of the offshore face of the holding pen to give the long side of the rectangular structure more support. He sought and found a disused anchor with cable attached, and obtained permission from the previous owner to use it. Within the industry, discarded anchors are sometimes reused; however, according to the owners of the "WOLCO VI", such a practice was not common on their tugs prior to this occurrence.

The operator was given the approximate dimensions of the anchor, but neither its weight nor the length of its cable. He had received no training on dragging anchors, and there was no established standard work practice.

On the morning of Sunday, 18 February 1996, the operator requested another employee to act as a deck-hand and assist him in setting up the holding pen. The morning was cold with the temperature close to the freezing point. The weather was calm and foggy as both men set out on the "WOLCO VI".

The operator was in command of the "WOLCO VI" and had the con. He was clad in work jeans and a shirt but was not wearing any personal flotation device (PFD). A life jacket was at hand close to the helm. The deck-hand wore rain gear over his clothes, cork boots, a hard hat, and a life jacket. He also carried a portable VHF R/T buckled to his pants. Both crew reportedly were in good health and knew how to swim.

At about 0950, after completing some housekeeping work, the two crew set out to connect the disused anchor and drag it toward the holding pen; the anchor was some 0.75 mile away and in a north-easterly direction from the holding pen. On reaching the anchor, the operator disconnected the boom stick markers (hereinafter referred to as the markers) and the deck-hand hooked the tug's polypropylene tow-line onto the anchor cable attached to the markers. The line was then belayed in a figure eight around the tow-post at the stern of the tug. A post-recovery inspection of the "WOLCO VI" revealed that the tow-line had been secured in such a way that it effectively locked onto the tow-post. It had a figure-eight wraparound and a locking bight. There was no axe ready at hand to cut the tow-line nor was a quick-release mechanism fitted to disengage the tow. The length of tow-line between the "WOLCO VI" and the anchor cable was only about 3 m, although more line was available for use.

As the operator attempted to drag the anchor, the strain on the tow-line caused the tug's stern to settle deeper and the afterdeck to partially submerge. He eased on the throttle and then tried a second time. This time, the tow seemed to move forward until there was a sudden jolt. The tug's stern settled deeper causing the afterdeck to become submerged. Sensing imminent danger, the deck-hand exited the wheel-house through the rear door to untie the tow-line. By the time he was halfway out of the door, the tug was listing to port. He hauled himself out of the rapidly sinking tug and cried out for help on his portable VHF R/T. He last saw the operator, still at the wheel with the throttle full ahead, and shouting at him to untie the tow-line.

The helicopter which was used for the logging operations had just landed at the camp when the helicopter's crew heard the deck-hand's calls for help on R/T Channel 1. They took off immediately and, within a few minutes, arrived on scene where they saw the tug sinking stern first and the deck-hand, who had abandoned the tug, in the water. They hovered very close to the water and rescued the deck-hand. He was brought back to camp and treated for mild hypothermia.

A second helicopter hovered over the area in an unsuccessful attempt to find and assist the operator. Professional divers hired by the logging company were used within the next few hours, but the sunken tug and the operator could not be located. Finally, a remotely operated diving vehicle was used, and the vessel was located on 24 February in about 134 m of water. Ten days after the occurrence, the tug was brought to the surface. The granite anchor, with 70 m of galvanized steel cable attached to it, was also recovered about 3 m from the tug. From its size, it was estimated to weigh some 10 tonnes, and when submerged in water, it weighed in excess of 6½ tonnes.

The operator's body was found in the port bunk in the forecabin sleeping area, decomposed with partial skeletonization. The autopsy showed that death was consistent with drowning. There was no external or internal evidence of blunt or sharp force injury.

Reference Comments on the Industry Respecting Marine Operations

Small craft, like the "WOLCO VI", be they tugs or landing craft, are used in the forestry industry for towing operations and to ferry machinery and vehicles, but are neither regulated nor required to be inspected under the *Canada Shipping Act* (CSA). Although the operator of the "WOLCO VI" had several years of experience in operating the vessel and some background in commercial fishing, he did not recognize the inherent dangers of attempting to tow and reposition an anchor of unknown weight and with an unknown length of anchor cable. There are no training or certification requirements for personnel to operate such craft. Following similar past occurrences where training had been identified as a safety issue and a TSB recommendation made, Transport Canada indicated that, although current regulations do not require Marine Emergency Duties (MED) training for personnel of uninspected vessels, proposed amendments to the crewing regulations will require basic MED training for all persons on ships over five gross tons.

Employment in the forestry industry in British Columbia is considered very hazardous. Over the last 20 years, there have been at least 500 fatalities, and over 4,700 loggers have been awarded permanent disability compensation. As a result, the industry has developed programs to address safety issues and to reduce the accident rate. The Board has recognized the initiative taken by the Forest Industrial Relations Members Companies and the International Woodworkers of Canada to develop procedures and training for the operation of craft carrying less than 12 passengers. In its report on the occurrence involving the "CROWN FOREST 72-68" (TSB Report No. M93W0005), the Board applauded this action but stated that training of personnel and the development of procedures for the handling of vessels should benefit from the input of marine expertise from Transport Canada (TC) Marine Safety.

In 1993, the Workers' Compensation Board of British Columbia (W.C.B. of B.C.) published a poster (Logging 93-08) to advise workers in the logging industry of the dangers associated with the operation of small craft. The poster calls for employers to provide written procedures on safe working practices for workers under their direction and control, and to ensure that machinery and equipment are safe.

ANALYSIS

Lack of Marine Training and Established Work Procedures and Practices in the Industry

Although the logging industry on the B.C. coast has a significant marine component in its work practices, there are few industry-wide guidelines for safe marine operations. Despite action by the Forest Industrial Relations Members Companies, the International Woodworkers of Canada and the W.C.B. of B.C. to further safety, it would appear that there are still areas of marine operations for which no standard procedures or guidelines have been established. Such was the case with respect to anchor dragging operations. Further, an aerial survey had been conducted to determine a good location for helicopter operations, but there was no guideline in place for the marine-related segment of the operations in determining the most appropriate site for the drop zone and the holding pen.

Use of Field Sheets versus CHS Charts

The large-scale Canadian Hydrographic Service (CHS) chart of the area (No. 3729) which was on board is primarily intended for navigational purposes with information on sea-bed and water depths appropriately spaced for clarity, and consequently, some details close to the coastline may be missing. However, the nature of the work being carried out required more detailed information on the soundings and sea-bed for the area. This information is contained on field sheets used in the preparation of the charts and is available upon request from the CHS for a nominal sum. No such request had been made. Further, if deemed necessary, detailed surveys can also be ordered from the CHS with cost to be born by the organization requesting the information.

Use of Suicide Bight

The suicide bight, which is a locking bight, is often used in the West Coast towing industry. The knot is secured such that the tow-line has to be slackened for the bight to be released or, alternatively, it will slide off when the tug is heeled over 90 degrees. In this instance, the suicide bight was not used.

Operational Factors

Operational factors involved in the sinking of the "WOLCO VI" included:

1. The chart in use indicates a steep shelf in the vicinity of the drop zone and holding pen. The echo-sounder had been non-operational for a period of time and this had been brought to the attention of the company at safety meetings, but no repair had been effected. Consequently, the operator was unable to determine the depth of water in which the tug was operating; a key piece of information, essential for the safe operation of the tug in the vicinity of the steeply shelving sea-bed.

2. Although the borrowing of anchors is common practice in the industry, neither the weight of the anchor nor the length of its cable is conspicuously posted at the float end. As in this instance, the lack of such information jeopardizes the safety of tug operations with potentially serious consequences.

While the operator was aware of the dimensions of the anchor, he knew neither its weight nor the length of its cable. As it turned out, when immersed in water, the anchor weighed more than 6½ tonnes, well in excess of the tug's handling capability. Also, the length of the anchor cable was less than half the required length. Hence, the heavy granite anchor, as it was being dragged over the steeply shelving sea-bed into deeper waters, caused the tug to settle deeper by the stern, heel heavily to port, and the afterdeck to become submerged. Downflooding from the open doors ensued and continued until the tug lost all reserve buoyancy and sank stern first.

Operator's Attempt to Escape

In the absence of eyewitness information, it was not possible to determine precisely why the operator was unable to exit the wheel-house. However, it is known that the tug heeled heavily to port and sank rapidly. The rotation of the body underwater, the loss of gravitational reference and the darkness associated with the wheel-house being underwater possibly resulted in the operator becoming disoriented, thus hampering his escape from the sunken vessel.

As the vessel commenced sinking stern first, any attempt by the operator to exit the wheel-house would have been thwarted by the strong inrush of water from the after sliding door, and any attempt to open the starboard door would have been hindered by the heavy port list and external water pressure. Thus, the operator may have had no other choice but to seek an air pocket, which generally can be found in the forecastle space, and this provides a possible explanation for the position in which the operator's body was found. Alternatively, the possibility that the force of the water rushing in from the stern may have swept the operator upward through the narrow doorway and into the forecastle cannot be ruled out.

FINDINGS

Industry Practices

1. Although the helicopter logging industry on the West Coast has a significant marine component in its work practices, there are:
 - few industry-wide guidelines for safe marine operations;

- neither regulatory nor industry requirements to have duly qualified personnel to operate marine craft, and
 - limited industry-proposed training programs in place.
2. Although the borrowing of anchors is common practice in the industry, neither the weight of the anchor nor the length of its cable is conspicuously posted at the float end.

Company Practices and Procedures

3. The crew members had received no training nor were they provided with instructions/guidelines by the company for the safe operation of the tug.
4. The echo-sounder had been defective for a period of time and this had been brought to the attention of the company at safety meetings, but no repair had been effected.
5. The large-scale CHS chart of the area was used instead of the more relevant field sheets while operating in the vicinity of the steeply shelving sea-bed.

Marine Operations

6. The small tug with limited horsepower was used to haul a heavy granite anchor, which was well in excess of the vessel's handling capability, without adequate safeguards in place.
7. Because of the defective echo-sounder, the operator was unable to determine the depth of water while operating in the vicinity of the steeply shelving sea-bed.
8. The operator knew neither the weight of the anchor, which was in excess of the tug's handling capability, nor the length of the anchor cable, which was less than half the required length.
9. Because of the short length of the tow-line and of the anchor cable, the anchor exerted a vertical downward force on the tug when she entered deeper waters.
10. The excessive weight of the anchor and the short length of the anchor cable caused the tug to settle deeper by the stern, and the afterdeck to become submerged. Downflooding from the open doors ensued and continued until the tug lost all reserve buoyancy and sank stern first.

11. The tug was not fitted with a quick-release mechanism to disengage the tow nor was an axe readily available to cut the tow-line in an emergency.
12. The suicide bight, which is intended to let the tow-line slide off when the tug is heeled over 90 degrees was not used.
13. The deck-hand, who was wearing a PFD, was rescued, but the operator became trapped and he drowned when the tug sank.

CAUSES AND CONTRIBUTING FACTORS

When the "WOLCO VI" entered deeper waters at Kwatna Inlet while hauling a heavy granite anchor along the sea-bed, the anchor exerted a vertical downward force on the tug and caused her to settle deeper by the stern, and the afterdeck to become submerged. Downflooding from the open doors ensued and continued until the tug lost all reserve buoyancy and sank stern first. Contributing factors to the occurrence were the lack of crew training, the absence of written work procedures and practices, the non-operational echo-sounder, the absence of a quick-release mechanism to disengage the tow, and the fact that the crew did not know the weight of the anchor, the length of the anchor cable nor the actual depth of water in which the tug was operating.

ACTION TAKEN

As a result of this occurrence, the company developed job safety procedures entitled *Procedures for the Manufacture of and Setting of Anchors*. The four-page document describes, inter alia, the method to be followed for the construction of rock anchors, the use of charts and depth sounders, and procedures related to anchor works, etc.

In addition, the company tugs have been fitted with quick-release mechanisms and video depth sounders.

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 5 November 1997.