MARINE INVESTIGATION REPORT
M00W0059

ACCIDENT ABOARD SHIP – ALONGSIDE

FISHING VESSEL – SALMON TROLLER "C - JOY"
PORT ALBERNI, BRITISH COLUMBIA
13 MARCH 2000

Marine Investigation Report

Accident Aboard Ship – Alongside

Fishing Vessel – Salmon Troller "C - JOY"
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Report Number M00W0059

Summary

On 13 March 2000, the owner/operator of a salmon troller slipped and fell while working alone in the vessel's fish hold. The left pant leg of his protective clothing became entangled in the rotating propeller shaft flange. Unable to free himself, his left foot and leg were drawn into the space between the flange and shaft housing and were crushed. He stalled the main engine and stopped the flange's rotation by forcing his right foot into the same limited space in which his left leg was caught. Later, in hospital, his left leg was amputated above the knee and his right foot underwent extensive surgical reconstruction.

Ce rapport est également disponible en français.

Factual Information

	"C - JOY"
Official Number	383974 (commercial fishing vessel (CFV) (25983)
Port of Registry	Vancouver, British Columbia (B.C.)
Flag	Canada
Type	Commercial Salmon Troller
Gross Tonnage	14.87[1]
Length	11.1 m
Built	1978, Maple Ridge, B.C.
Propulsion	Marine diesel engine 117 bhp driving a fixed-pitch propeller
Crew	1 member
Owner(s)	Clifford Arthur Olsen

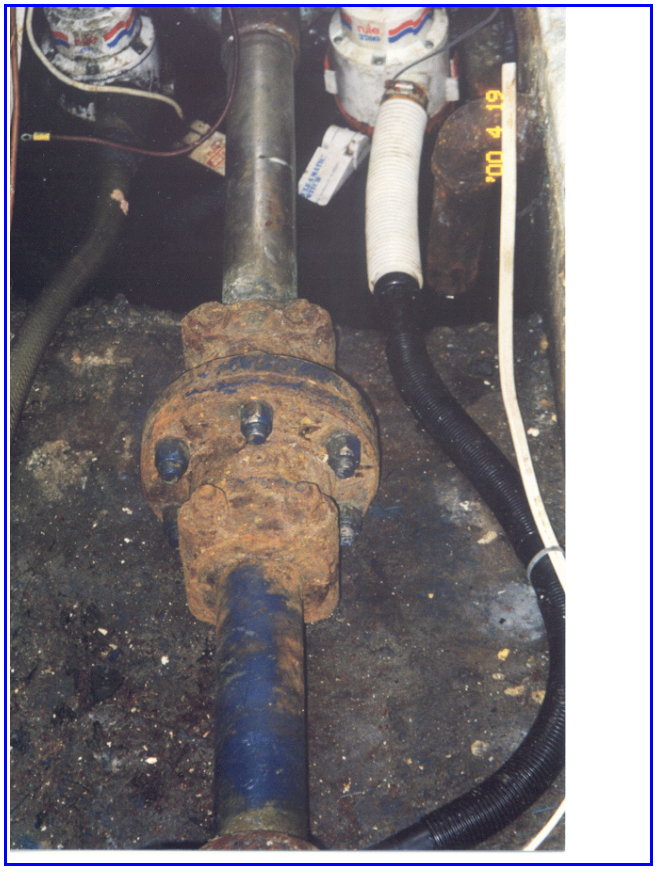
Description of the Vessel

The "C- JOY" is a commercial salmon troller built in 1978 of moulded fibreglass construction. Below decks forward is crew accommodation. Abaft it is the machinery space, aft of which (and separated from it by a watertight transverse bulkhead) is a refrigerated fish hold, at the after end of which is another watertight transverse bulkhead. Abaft of this bulkhead is a lazarette terminating in a transom stern (see Photo 1).

On the weather deck forward is a short foredeck and an enclosed wheelhouse, abaft of which is a main working deck on which is a raised hatch that provides access to the fish hold below it. Near the stern of the vessel is a recessed transverse area, known as the "cockpit", where fishing operations are conducted.

[1] Units of measurement in this report conform to International Maritime Organization standards or, where there is no such standard, are expressed in the International System of units.

Description of the Fish Hold



The vessel's fish hold is approximately 4.26 m long, 2.5 m wide, and 1.73 m high. It is divided into eight compartments—three to port, three to starboard, one aft, and one on the centre line—by means of pen boards, removable lengths of aluminum dividers, each of which measures approximately 1 m x 200 mm. During normal fishing operations, salmon is stowed in these compartments.

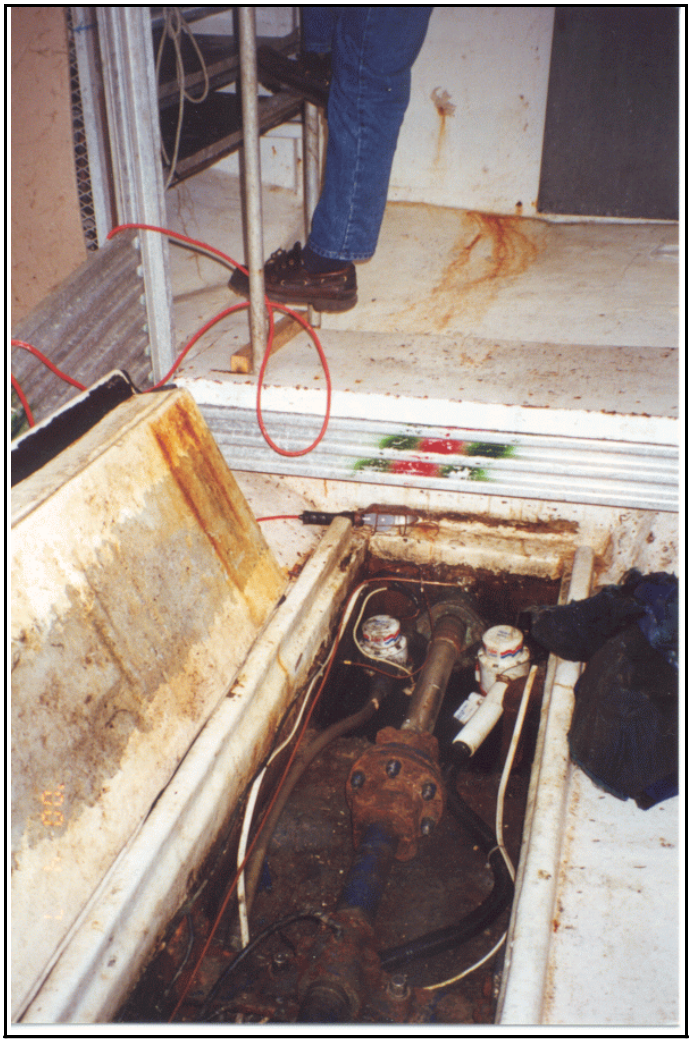
Beneath the centre line compartment is a recessed longitudinal void space (i.e., shaft well) through which pass the intermediate and propeller shafts connected by a shaft coupling (see Photo 2). This arrangement of shafts and coupling transmits power from the main engine to the vessel's propeller.

The shaft well is approximately 3.15 m long, 610 mm wide, and 310 mm high. The distance between the shaft coupling and the sides of the shaft well is approximately 150 mm. Access to the shaft well and shaft coupling is by a heavily constructed glass reinforced plastic cover, which extends as a

single unit from the forward transverse bulkhead of the fish hold aft to approximately 1.12 m forward of the after transverse bulkhead.

A four-rung aluminum ladder is fixed between the after starboard side of the raised hatch located on the main working deck and a painted, 1.19 m x 510 mm x 19 mm plywood platform in the fish hold at the base of the ladder. The surface of the platform, which is 40 mm above and directly abaft the shaft well, is gouged and worn (see Photo 3).

shaft well cover



stern gland

shaft coupling

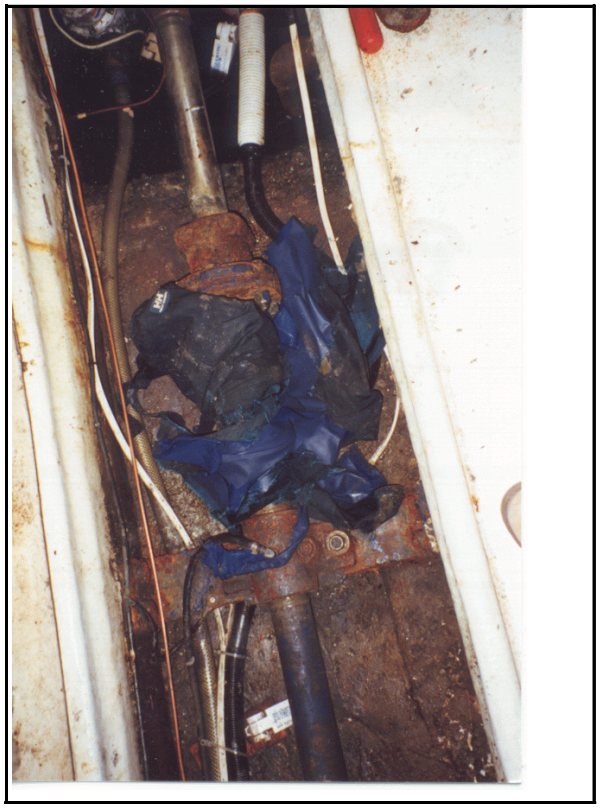
Events Leading up to the Occurrence

On 13 March 2000, the "C-JOY" was secured alongside in Port Alberni where its owner/operator worked alone to prepare his vessel to participate in a limited test fishery scheduled for the following day. As part of his work, he removed the cover of the shaft well in order to access the stern gland and replace its packing. Upon

completion of this task, he entered the wheelhouse, started the main engine, and engaged gear so that the propeller shafts rotated. Having done so, he left the wheelhouse, walked along the working deck, and descended the ladder into the fish hold to verify that the newly installed stern gland packing was effective in preventing seawater from entering the hull.

As the owner/operator reached the platform at the base of the ladder, he lost his footing. His legs went forward from underneath him and the left cuff of his weather protective trousers became entangled in the bolts of the rotating shaft coupling (see Photo 4). The operator's left leg was drawn progressively into the 150 mm void between a shaft coupling and the interior port side of the shaft well.

In a desperate attempt to stop the coupling from rotating, the owner/operator forced his right foot into the area where his left leg was already caught and was ultimately successful in stalling the main engine.



Alone on his vessel and with few people on the surrounding floats, the owner/operator's cries for assistance went unheard for approximately 20 minutes. Once he was discovered, he was taken by ambulance to a Port Alberni hospital. Later that day he was transported to a hospital in Victoria, B.C., where his left leg was amputated above the knee and extensive reconstructive surgery performed on his right foot.

Vessel Certification

At less than 15 gross tons, the "C-JOY" is exempt from quadrennial inspection by Transport Canada's Marine Safety Branch and the issuance of an SIC 29 certificate.

Protective Clothing

The owner/operator was wearing a pair of weather protective pants commonly known as "rain pants", the cuffs of which were worn over the outside of his sea boots in a manner favoured by many west coast fishers. His footwear consisted of sea boots with flat, natural rubber soles, etched to provide traction while walking on wet surfaces.

Analysis

Protective Clothing

The rain pants worn by the owner/operator were sewn of tear-resistant material. A person wearing garment of this material is likely to find it more difficult to free it from moving machinery than if it had been made of material less resistant to tearing.

In this instance, a cautionary label informing the reader of the tear-resistant nature of the rain pants was printed on a plastic stowage bag which accompanied the garment at the time of purchase and was subsequently discarded. No notice was on the pants themselves to remind the wearer of the characteristics of the material.

The Shaft Well Cover

The one-piece shaft-well cover extends over most of the length of the fish hold. The removal of the cover to permit the owner/operator access to the stern gland also exposed the rotating shaft coupling located 600 mm forward of it.

Working Alone in a Confined Space

It is common practice for the operators of small fishing vessels to work alone both at sea and in port where maintenance work is done. In this instance, no one monitored the owner/operator while he worked in the hold. Had someone done so, it is probable the rotation of the propeller shaft and coupling could have been stopped sooner and the severity of the owner/operator's injuries lessened.

The safety importance of such a 'stand-by' person has been recognized by B. C.'s Workers' Compensation Board.[2]

Findings

Findings as to Causes and Contributing Factors

1. The owner/operator was working alone in a confined space where the guard on turning machinery had been removed.

2. The removal of the shaft well cover to work on the stern gland also exposed the rotating shaft coupling which caught and trapped the hem of the owner/operator's rain pants.

3. The severity of the owner/operator's injuries was due to his inability to stop the rotating propeller shaft and to the tear-resistant fabric of the rain pants worn by him. The fabric did not tear when first caught and the owner/operator's leg was drawn into the rotating shaft coupling with it.

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[2] Workers' Compensation Board of British Columbia. *Occupational Health & Safety Regulations*, Part 9.35, April 15, 1998.

4. No one knew that the owner/operator was working alone and had become trapped in the machinery, thus delaying assistance and medical attention.

Findings as to Risk

1. The presence of a warning label on the garment could have raised the owner/operator's awareness of the potential danger of wearing tear-resistant clothing while working near moving equipment.

2. No one monitored the owner/operator while he worked in the hold. Had someone done so, it is probable the rotation of the propeller shaft and coupling could have been stopped sooner and the severity of the owner/operator's injuries lessened.

Safety Action

Action Taken

The manufacturer of these tear-resistant garments will henceforth affix a warning label to the garments instead of to the garments' stowage bag.

The warning label itself has been re-phrased to caution the wearer not to wear the garments when working near exposed moving machinery. The exact wording of the new label is as follows:

CAUTION

ARMOUR FABRIC IS TEAR
RESISTANT. DIFFICULT TO TEAR IF
HOOKED. NOT RECOMMENDED
FOR LONG LINING OR HAND
LINING. USE EXTREME CAUTION
NEAR EQUIPMENT WITH EXPOSED
MOVING PARTS.

Transport Canada's Marine Safety Branch and the Workers' Compensation Board of British Columbia have signed a Memorandum of Understanding to exchange information intended to improve operational and occupational safety on commercial fishing vessels working in British Columbia.

Additionally, as a result of numerous incidents on fishing vessels, TCMS inspectors are carrying out random inspections on this class of vessel (i.e., vessels below 15 GRT).

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 22 January 2002.