

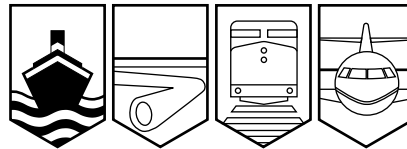
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

MARINE INVESTIGATION REPORT

M99F0038



MAN OVERBOARD/DEATH

THE RAIL BARGE "JUNEAU", ACCOMPANIED BY THE TUGS
"SEASPAN PACER" AND
"ESCORT EAGLE"

SEATTLE, WASHINGTON, USA

28 DECEMBER 1999

Canada

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 Investigation Report

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Seattle, Washington, USA
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Summary

While berthing the barge "JUNEAU" in Seattle, the chief mate from the tug "SEASPAN PACER" fell overboard. He was trapped between the barge and the dolphin and sustained serious injuries. In spite of a prompt response by the crews of the tugs and emergency units, he did not regain consciousness and was declared dead upon arrival at a local hospital.

Ce rapport est également disponible en français.

Factual Information

Particulars of the Vessels

| | “JUNEAU” | “SEASPAN PACER” | “ESCORT EAGLE” |
|-----------------------------|---------------------------------|--------------------------------|--------------------------|
| Port of Registry | Seattle, Wash. | Vancouver, B.C. | Seattle, Wash. |
| Flag | USA | Canada | USA |
| Registry/ Licence Number | 524833 | 328843 | 1028597 |
| Type | Freight Barge | Tugboat | Tugboat |
| Gross Register Tons | 5051 | 203 | 149 |
| Length | 122 m | 27 m | 33.4 m |
| Draught | 2.6 m | 4.8 m | 2.5 m |
| Built | 1970, San Francisco, Calif. | 1967, New Westminster, B.C. | 1995, Freeland, Wash. |
| Propulsion | None | Diesel, 1677 kW, Twin screw | Z-drives |
| Crew | Nil | 5 | 6 |
| Passengers | Nil | Nil | Nil |
| Registered Owner | Crowley Marine Services Inc. | Seaspan International Ltd. | D & V Boat Company |

Description of Vessels

The “SEASPAN PACER” is a steel tug used mainly for coastal towing of barges and log booms. On December 28 the tug had a crew of five, including the skipper. All were long-time employees of the company and experienced in towing operations.

The barge “JUNEAU” is a steel, flat-deck, roll-on/roll-off barge, adapted to carry rail cars between specially designed loading ramps on the West Coast. Its bow and stern are flat and square, with rounded corners. Six pairs of railway tracks run the length of the deck. The “JUNEAU” is owned by a United States company, and is operated by the owners of the “SEASPAN PACER” on a bare-boat charter basis.



Figure 1 - The “JUNEAU” with rail cars on all six tracks

The "JUNEAU" has a wire rope safety line running along each side, supported by angle-iron stanchions welded to the deck. Positioned about 60 cm inboard from the edge of the deck, the line is about 90 cm high and ends about 4 m from the stern (see Figure 2).

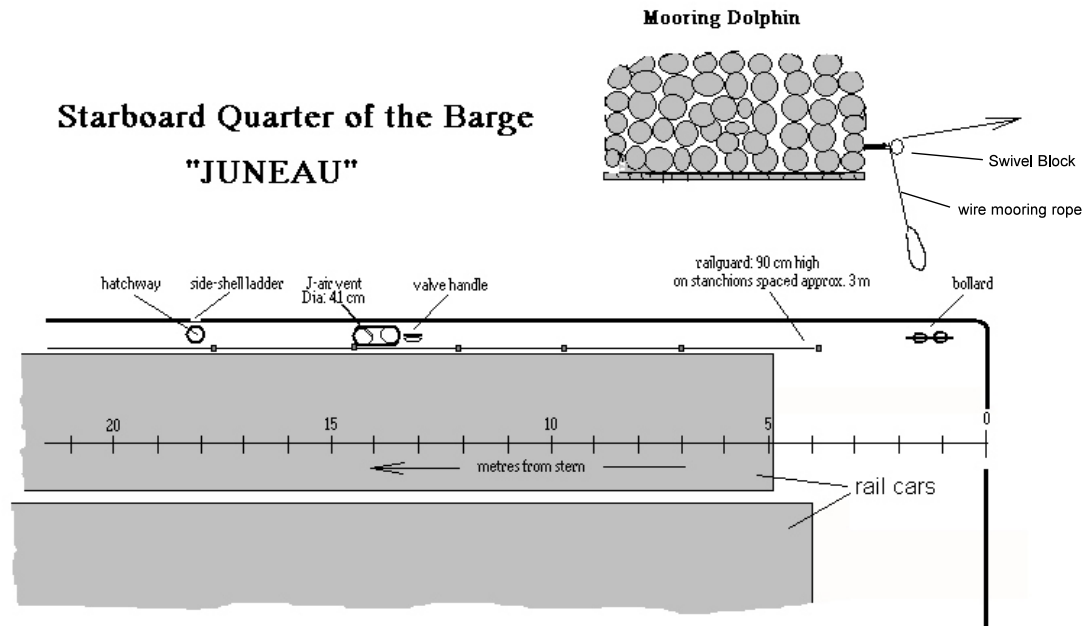


Figure 2

| Item | Distance from edge of deck | Height | Distance from stern |
|---|----------------------------|--------|---------------------|
| a mooring bollard (two vertical posts, approximately 90 cm apart, and a horizontal bar) positioned longitudinally, next to the rounded corner of the deck | | | 1.5 m |
| a valve handle with its support bracket | 25 cm | 60 cm | 12.8 m |
| a vent pipe (an inverted J-shaped pipe, 41 cm in diameter) The inboard side of the vent is in line with the safety line. Its horizontal member is 1.2 m long and fitted with two bars on top. A flat ring plate of outer diameter approximately 51 cm is welded to the vent pipe where it passes through the deck. | 20 cm | 1.2 m | 13.4 m |
| an electrical cable steel conduit (approximately 4 cm in diameter) Near the hatchway it extends closer to the edge of the deck. | 18 cm | 10 cm | 18 m |
| a round hatchway | | 30 cm | 18.3 m |
| ladder handhold Directly underneath the ladder handhold, next to the hatchway, is an outboard side shell ladder that was used during the attempt to rescue the mate. | 15 cm | | 18.3 m |
| another vent and several eye pads are affixed to the deck along the walkway farther forward | | | 2.4 m intervals |

The present charterer of the barge installed the safety lines two years before the occurrence. Their design and location (inboard of the edge of the deck on the "JUNEAU") follows the pattern adopted on other barges (mostly chip barges with boxes on decks). The same charterer operates a sister barge of the "JUNEAU" which is also adapted to carry rail cars. However, unlike the "JUNEAU", it is fitted with solid bulwarks in line with the side shell plating.

The underdeck space of the "JUNEAU" is divided into 10 compartments used as ballast tanks, and a dedicated pump-room fitted with electrically powered pumps. The ballast system, including vent pipes along the sides of the deck with handholds installed on the vent pipes, was installed at the request of the present charterer in accordance with the clauses of the prevailing charter party. The specifications for the ballast system as requested by the charterer were approved by both the relevant marine regulatory authority and classification society prior to installation on board the barge. The safety lines were already in place at the time of that installation.



Figure 3 - The walkway with the rail tracks occupied

When the railcars are loaded and stowed on all six tracks, the entire width of the deck between the safety lines is occupied. The 60 cm space outside of either safety line is thence used as a walkway between the bow and the stern. Along the walkway are several items attached to the deck, including cleats, hatchways, eye pads and vent pipes.

Site of the Occurrence

Pier 15½ in Seattle harbour is at the north end of Harbour Island in Elliott Bay. It is fitted with a ramp for loading rail cars via two rail tracks. The ramp is supported by a submerged buoyancy chamber; it is approximately 7.6 m wide and extends northward about 36 m from shore (see Figure 4).

Off the end of the ramp are four mooring dolphins which form a rectangle in line with the ramp, 44 m long and 36.5 m wide.

The inward-facing wall of each dolphin is covered with vertical planks, giving the dolphin a flat mooring surface approximately 6 m long.

On the inshore side of each dolphin there is a swivel block supporting a mooring cable. Two winches, each with two drums and in line with one pair of dolphins, are situated ashore. Next to the winches there are lamp posts with lighting. The cables and winches are used to secure and reposition rail barges against the ramp. The barges are shifted laterally between the dolphins using the mooring wires and onshore winches in order to align the barge tracks with the ramp tracks.

History of the Voyage

On December 27 the "SEASPAN PACER" was secured by a towline to the barge "JUNEAU" and left Vancouver at approximately 1430 Pacific standard time bound for Seattle.¹ The barge was loaded with rail cars in all six rows. On December 28 at approximately 0630, after an uneventful passage, the tug and barge entered Elliott Bay. At approximately 0700, when just north of Pier 15½, the skipper of the "SEASPAN PACER" ordered the towline shortened, and the barge turned around to prepare for berthing with its stern to the ramp. One local harbour tug, the "ESCORT EAGLE", arrived to assist in handling of the barge.

After shortening the towline to the length of the bridles, the stern gunwale of the "SEASPAN PACER" was in direct contact with the bow of the barge. The "ESCORT EAGLE" secured one line to the barge's port quarter and the crews of both tugs took their stations. Four persons, two from either tug, were sent onto the barge, each wearing a personal flotation device (PFD): the mate and a deckhand from the "SEASPAN PACER", and an engineer and a deckhand from the "ESCORT EAGLE". The mate, who was in charge of the group, used a hand-held very high frequency (VHF) radio to maintain contact with the tugs, and directed both the tugs' skippers and the remaining three persons when the barge was being positioned between the mooring dolphins.

Following a previously established pattern, the barge was manoeuvred, stern first, between the two outward dolphins. Subsequently the starboard quarter of the barge was brought to within 2 m of the inner, southeast dolphin to allow the crew on board to reach a polypropylene tag line attached to a wire mooring rope suspended from the dolphin's swivel block.

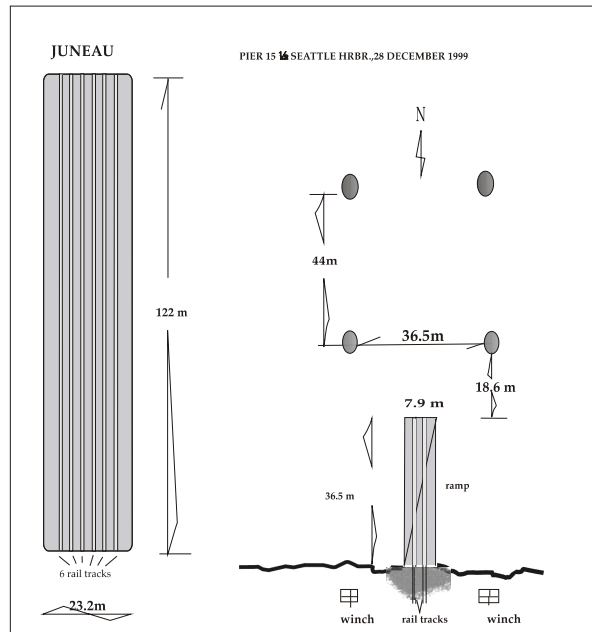


Figure 4

¹ All times are Pacific standard time (coordinated universal time minus eight hours).

The barge was at this time on a heading slightly to the northwest, askew to the ramp; the bow of the barge was approximately 20 to 30 m from the outer, northeast dolphin. The tugs' skippers could not see the starboard side of the barge or the southeast dolphin from their positions. They manoeuvred their vessels according to the mate's instructions.

After securing the mooring wire on the starboard quarter bollard, the three crew members turned away from the bollard and, using the walkway on the starboard side of the barge, headed towards the bow to secure another mooring wire. It is unknown whether the mate followed them as expected; he was seen standing on the barge's starboard side, close to the edge between the aft bollard and the air vent. He had reported to the tugs that the first, starboard quarter wire was secured and instructed the "ESCORT EAGLE" to "push to hold." The wire secured to the aft bollard was the only connection between the barge and the shore, and was not yet winched.

When the three crew members were approximately 12 to 15 m forward of the aft vent pipe, they heard a loud yell behind them. They looked back and the last of the three saw the mate falling (cartwheeling) overboard, astern of the vent pipe. They all observed the mate in the water, floating on his back, apparently unconscious, with his face partly submerged and the lower part of his body trapped between the dolphin and the barge's side.

The engineer shouted "man overboard", threw a life vest in the water and rushed to the barge's port quarter to instruct the "ESCORT EAGLE" to stop pushing. The event was logged on the "ESCORT EAGLE" at 0715. He also instructed a person standing on the ramp to call "911". Upon receiving the information from the engineer, the "ESCORT EAGLE" cast off and proceeded to sail around the bow of the barge towards the site of the occurrence.

The remaining two crew members on the barge began to assist the mate in the water, who remained unconscious throughout. One of them used a 22-foot pike pole with a hook, the other climbed down the side ladder. Having secured the mate's head above the water with the pole hooked to the mate's collar, the person on the ladder climbed back on deck; reportedly the ladder was too close to the dolphin and he was afraid of being pinned against the dolphin.

The "SEASPAN PACER" was still tied up to the barge's bow and its skipper was unaware of the accident. Having heard that the first wire had been secured, and the instruction from the mate on the barge for the other tug to "push to hold," the skipper was expecting a subsequent radio call. Approximately a minute later the skipper of the "SEASPAN PACER", a bit alarmed by the silence, called the mate on the VHF. Receiving no response, he repeated the call two or three times. After his last call the "ESCORT EAGLE", already on its way around the bow of the "SEASPAN PACER", responded advising of the mate in the water. The "SEASPAN PACER" was untied from the bow of the barge and followed the "ESCORT EAGLE".

A few minutes later the "ESCORT EAGLE" arrived on scene with a portable ladder suspended in the water. One crew member entered the water, swam towards the mate and, with two other crew members reaching from the tug, picked up the mate and placed him on the tug's deck. The time was logged as 0720. The "ESCORT EAGLE", with its crew administering cardiopulmonary resuscitation to the unconscious mate, moved towards Pier 17, arriving at 0725 at the same time as an ambulance, fire engines and police arrived.

The mate was wearing hiking boots, and dark-blue coveralls over his clothes, and a flotation vest with no pockets. Neither the hand-held VHF nor any protective gear was found on or near him. He was not equipped with a belt holder with which to carry the VHF. A few minutes after the accident a work glove was recovered from the water near the ramp. Reportedly, the mate was not wearing a hard hat, nor did he have the head lamp provided by the owners.

At 0740 the ambulance personnel removed the mate from the tug and transported him to a local hospital. He never regained consciousness and was declared dead upon arrival. According to the autopsy report, the mate died as a result of massive injuries and bone fractures in the skull and torso.

Conditions on the Barge Deck

The weather was reported as foggy with light wind and calm water surface. The accident occurred at dawn, and it was still dark. There were no permanent deck lights on the "JUNEAU" and no deck lighting was provided; neither of the tugs was in a position to use its spot lights to light the starboard quarter of the barge. Some lighting was coming from the rail ramp but, with rail cars on the deck, the starboard quarter of the barge was in shadow.



Figure 5 - Starboard quarter of the barge.
Mooring winch and lamp post ashore are circled.

Every seagoing employee of the owners of the tug was issued a battery-operated portable lamp. These lamps, which are often clipped to head gear (and hence referred to as "head lamps") provide some illumination of the work area. At the time of the occurrence, the deckhand was wearing his head lamp.

The deck of the "JUNEAU" was reported to have been moist with dew at the time of the occurrence. The TSB investigation found that the steel plates of the deck, while free of any oily stains, were partially covered with rust, and had paint flaking off in some places.

Routine Barge Movement

Surface current during the entire berthing operation was negligible. The berthing was described as routine and neither tug had to use excessive force to handle the barge. Reportedly, at no time during berthing did the barge move violently.

Tug Personnel

The skipper of the "SEASPAN PACER" had an ON-2 certificate of competency issued in 1990. He had approximately 33 years of towing experience in B.C. coastal waters, and over the previous five years he had served as a skipper on various tugs owned by Seaspan, including about three years on the "SEASPAN PACER".

The mate had an ON-1 certificate of competency issued in 1983 and endorsed in 1992. Between 1983 and 1993 he took four different Marine Emergency Duties courses. He had worked and progressed through the officers' ranks on various vessels on the B.C. coast during more than 20 years, and since 1996 had sailed as mate and occasionally as master on tugs owned by Seaspan International.

Analysis

It cannot be known for certain where the mate was standing when he fell overboard. Reportedly, he was somewhere between the bollard and the side shell ladder. It is not known if he was walking towards the bow, following other crew members, or was still monitoring the barge's progress when he fell.

The cause of his fall is equally uncertain. Although the partially rusty deck plates created, in general, a non-slippery surface, the deck was moist with dew at the time of the accident, and there were likely some slippery patches.

According to one account, the mate fell overboard astern of the air vent pipe, which suggests that he had not attempted to pass by the pipe. However, immediately after the mate fell, another crew member climbed down the side ladder, approximately five metres *ahead* of the pipe, to assist the mate.

Notwithstanding the above ambiguities, there are several safety issues associated with the barge and the equipment:

- location of safety lines;
- obstacles on walkway; and
- other factors.

Location of the Safety Lines

The walkway safety lines on the "JUNEAU" follow the same design and location (60 cm inboard of the edge) as those on the chip barges. For protection against falling overboard, a person must hold on to the line continuously while using the walkway. On the chip barges, the safety lines were attached—inboard of the edge of the deck—to pre-existing deck box stiffeners. The "JUNEAU" does not have such stiffeners, and neither the stanchions nor the lines were attached to any existing fixtures on the barge. When these safety lines were (fairly recently) installed, there was no pre-existing structure influencing their location, and they could have been

installed in the best possible location—at the edge of the barge—thus guarding the walkway on the outside. The sister barge of the “JUNEAU” is fitted with a bulwark along the side, a safer method of guarding the edge of the deck.

Obstacles on Walkway

The entire deck of the barge was used for loading rail cars. The nature of the load precluded the installation of any large fixtures within the loading area. The only available surfaces on which to place the bollards, manholes, cleats, vents, etc., without decreasing the loading space, was the 60 cm strip of the deck at the sides of the barge. The owners of the barge made use of the two strips, placing there all the auxiliary features.

It was logical to place the bollards at the edge of the barge. While the manholes, cleats, handholds and other low-profile protrusions are obstacles, a trained seaman could easily pass by them. However, the 41 cm diameter vents in the 60 cm wide walkway were not placed with full regard to the safety of personnel, though handholds had been installed on the top of each vent. A person passing by the vent uses both hands to hold onto the bars on top of the vent. While passing a vent, a person’s centre of gravity briefly passes over the side of the barge; this occurs while the only available foothold is the 19 cm wide, uneven surface between the body of the vent and the edge of the deck.

It is possible for a physically fit person, with only one hand free, to pass the vent while grasping the bars with only one hand. However, such a manoeuvre is unsafe—especially when the deck is wet and footing may be easily lost.

Other Factors

The mate who fell from the “JUNEAU” was recovered without the hand-held VHF radio in his pocket. It is not known however, if at the time of falling, he carried it or had it in the pocket of his coveralls. One glove, possibly his, was recovered from the water near the site of the accident.

Attachment of the VHF radio to the mate’s coverall or to a waist belt attachment would have left both his hands free to hold on to the safety line and, when passing around the vent pipe, to grab the handholds on the vents.

The severe injuries to the torso were caused by crushing between the side of the barge and the dolphin. However, the head injury was most probably caused when the mate, falling over the side, hit either the dolphin or the barge. The wearing of a hard hat (as supplied by the employer) *may* minimize head injuries.

The lack of dedicated lighting made sighting the deck fixtures difficult and, consequently, would have made passage across the deck—over and around the deck fixtures—more difficult to execute safely.

Findings as to Causes and Contributing Factors

1. The working conditions on board the barge "JUNEAU", comprising a narrow and inadequately protected walkway on its side, the lack of lighting, obstructions and protrusions located within the walkway, and the dew-covered surface of the deck, are factors conducive to an accident.
2. Safety equipment such as a hard hat and headlamp were not used; and the non-strapping of the radio to the coverall exposed the deckhand to higher-than-normal risk and reduced his chances of survival in the accident.

Safety Action

Action Taken

As a result of this occurrence, Seaspan International Ltd. carried out the following modifications to the barge "JUNEAU":

- fuel and water vents were capped at deck level;
- containment berms around these vents were removed;
- additional handhold was installed on the top of the ballast vent; and
- vent lid dogs were removed.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 18 September 2001.