SAFER SEAS DIGEST 2019

Lessons Learned *from* Marine Accident Investigations

NTSB National Transportation Safety Board

NTSB/SPC-20-04

AVIATION

HIGHWAY

MARINE

RAILROAD

PIPELINE

MISSION

The National Transportation Safety Board (NTSB) is an independent Federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation — marine, railroad, highway, and pipeline.

The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. In addition, the NTSB carries out special studies concerning transportation safety and coordinates the resources of the Federal Government and other organizations to provide assistance to victims and their family members impacted by major transportation disasters.

A Message *from the* Chairman

The 30 marine accidents included in *Safer Seas Digest 2019* involved contact with fixed objects, breakaways, sinkings, collisions, fires, explosions, floodings, groundings, and other vessel damage. The vessels ranged from personal craft to oceangoing passenger ships and even a US Navy destroyer.

The accidents recounted here resulted in numerous injuries and significant property damage, and worst of all, the loss of thirty-two crewmembers and passengers. Readers might recall that 17 of those lost were on a recreational trip aboard the amphibious vessel ***Stretch Duck 7***. Another 10 of the mariners lost were sailors serving aboard the USS ***John S McCain*** when it collided with the tanker ***Alnic MC***.

Accidents do not respect their victims' occupations or, for that matter, their leisure activities. Whether serving in the nation's armed forces, enjoying a recreational tour, fishing on a trawler, or keeping commodities flowing on tankers and freighters, we are all reliant on the safety measures that must be in place before we step aboard. The NTSB learns the safety lessons from these accidents and recommends safety improvements to prevent recurrences. It is up to the marine industry and its regulators in the Coast Guard to act on these recommendations to improve marine safety.

The safety issues examined in the 2019 edition of *Safer Seas* include:

- Organizational Oversight
- Fatigue
- Master/Pilot Exchange
- Proper Navigation
- Dynamic Risk Assessment
- Proper Lookout
- Early Communication Prior to and During Emergency Situations
- Heavy Weather Conditions
- Seafloor Hazards in Undersea Operations
- Effective Hull and Structural Component Inspection & Maintenance
- Watertight Integrity and Subdivision
- Fire Protection During Hot Work
- Securing Ventilation and Openings During a Fire
- Remote Fuel Oil and Lube Oil Cut-Off Valves
- Labeling of Alarms

This digest is organized around NTSB investigations that came to a close in 2019. They represent a snapshot within the ongoing cycle of accidents, NTSB investigations, and safety improvements that ensures that lessons learned result in changes. In recent years, the loss of the cargo vessel ***El Faro*** resulted in sweeping recommendations, especially to oceangoing shipping. Next year we will include the outcome of the fire aboard the dive boat ***Conception***, which might be similarly influential in the world of small passenger vessels.

The US Coast Guard is integral to the NTSB's marine investigations. Our relationship is an outstanding example of government collaboration focused on saving lives and improving safety. Every accident presented in this report was supported in a variety of ways by the men and women of the Coast Guard, and my sincerest thanks go out to every one of them who assisted us this year. The Coast Guard units that worked with the NTSB in these accidents are listed on page 94.

With every investigation we learn new safety lessons to prevent or mitigate future losses—but only when marine stakeholders at all levels of the industry apply these lessons.

I hope that *Safer Seas Digest 2019* provides the marine industry with essential information to better understand the safety issues confronting it.

Sincerely,

Robert L. Sumwalt, III
Chairman

SAFER SEAS DIGEST 2019

Lessons Learned *from* Marine Accident Investigations

ABBREVIATIONS

AB	able-bodied seaman
ABS	American Bureau of Shipping
ARPA	automatic radar and plotting aid
ATB	articulated tug and barge
BAC	blood alcohol content
CCTV	closed-circuit television
CO_2	carbon dioxide
COLREGS	International Regulations for Preventing Collisions at Sea
dba	doing buisiness as
EBL	electronic bearing line
ECDIS	electronic chart display and information system
ECS	electronic charting system
g/dL	grams per deciliter
GPS	global positioning system
mph	miles per hour
MDG	main diesel generator
MTBE	methyl tertbutyl ether
NOAA	National Oceanic and Atmospheric Administration
OOD	Officer of the Day
SCBA	self-contained breathing apparatus
SCC	Ship Control Console
SMS	safety management system
TSMS	towing safety management system
UHF	ultra high frequency
VHF	very high frequency

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VESSEL GROUP KEY

CARGO	OFFSHORE SUPPLY	TANKER
FISHING	PASSENGER	TOWING/BARGE
GOVERNMENT	RECREATIONAL	OTHER

ACCIDENT TYPE	VESSEL GROUP
CAPSIZING/LISTING	**TOWING/BARGE**

Capsizing and Sinking of Barge ***Dredge200*** and Loss of Workboat ***R.E. Pierson 2*** Pushed by Tugboat ***Big Jake***

LOCATION	
MASSACHUSETTS BAY, MASSACHUSETTS, 5 MILES EAST OF MINOTS LEDGE LIGHT	
ACCIDENT DATE **DECEMBER 2, 2018**	REPORT NUMBER **MAB 19/38**
ACCIDENT ID **DCA19FM009**	ISSUED **DECEMBER 20, 2019**

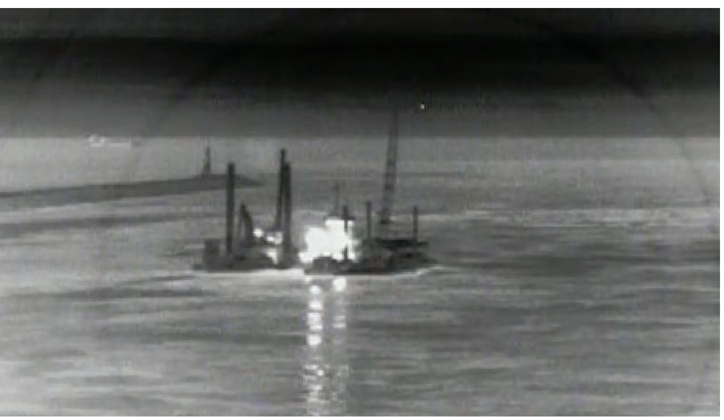


Figure 1. Aft view of the towing vessel *Big Jake* and barges transiting the Cape Cod Canal.
SOURCE: US ARMY CORPS OF ENGINEERS

Figure 2. The *Big Jake*'s tow with the *Dredge200* in the foreground during the accident. SOURCE: COAST GUARD

On December 2, 2018, about 0930 local time, the towing vessel *Big Jake* was under way in Massachusetts Bay towing five barges and two workboats when the tow broke apart. As a result of the breakaway, the barge *Dredge200* and the workboat *R.E. Pierson 2* both sank. Two crewmembers received minor injuries. Although both sunken vessels had fuel and lube oil on board, no visible oil sheen or pollution was reported. Estimated value of the *Dredge200* and *R.E. Pierson 2* totaled $1.98 million.

The *Big Jake* and its tow, which included five barges (*TMC 140*, *TRIPP87*, *Dredge200*, a Flexifloat barge, and a work barge) and two small push boats (*R.E. Pierson 2*, *Square Deal*), departed from Riverside, Connecticut, on November 30 for Hingham Bay, Massachusetts, with a captain, mate, crane operator, engineer, deckhand, and the vessel owner.

About 1145 on November 30, the captain and owner contacted the Cape Cod Canal marine traffic controller to request passage permission. The on-duty canal manager granted approval around 1430. Given the next fair tide was forecasted to start at 2248, the controller told the crew that they could begin their passage at 2230.

The tow spudded down in Buzzards Bay, Massachusetts, on December 1 about 1230. The captain, owner, and company had previously discussed that the voyage would have to be completed with seas not exceeding 4 feet. However, at 1532, the forecast for Sunday, December 2 predicted seas 5–6 feet. The crew contacted canal marine traffic controllers several times over the next six hours, requesting approval to proceed prior to their approved passage time, which marine traffic controllers denied.

At 2252, the *Big Jake* and its tow proceeded from the anchorage and transited the canal. As the tow left the canal about 0043 on December 2, the winds and seas began to build. The pitching and rolling of the vessel woke the owner and deckhand around 0600. The captain estimated the seas to be 4–6 feet and strengthening.

About 0730, the crane operator awoke to the sound of one of the dredge's spuds swaying: the spud wedges had loosened due to the vessel movement. The crew checked and added lines to the *Dredge200*, Flexifloat barge, *TRIPP87,* and workboats. About 0832, the captain slowed to bare steerage, and the port face cable snapped on *TMC140.* The captain directed the crew to release the starboard wire holding the ***TMC140*** to the tug. As the captain maneuvered the vessel to recover the barge, the steering system failed to respond, and the main rudders went hard-over. At the time of the steering failure, the 12-volt battery supplying power to the wheelhouse electronics also failed. The VHF-FM radio's antenna was also damaged at this time, so the captain switched communications to a handheld VHF-FM radio.

The tow was now broadside to the seas, increasing the rolling and pitching of the vessel. Over the course of about 30 minutes, the crew attempted to keep the barges and workboats together, to no avail. The barges and workboats drifted away, with the exception of *TRIPP87*.

About 0930, the captain contacted the US Coast Guard, who responded to the scene along with three tugboats. The ***TMC140***, Flexifloat barge, work barge, and ***Square Deal*** were located and brought safely back to port. On December 4, the ***Dredge200*** was found in Broad Sound about 15 miles from where it broke free. At the completion of the investigation, the barge had not been salvaged. The ***R.E. Pierson 2*** was not recovered and was assumed to have sunk.

The ***Big Jake***'s crew stated that the Cape Cod Canal traffic controller delayed their transit through the canal, which resulted in them getting caught in bad weather on the other side. However, it appears that that the agency followed their standard protocols to ensure safe passage of vessels when assigning the transit time. According to the controller, they would time the passage to a fair tide to minimize the disruption to other canal traffic. Further, the captain and owner had ample time to evaluate the weather forecast.

Although the captain and owner set a limit of 4-foot seas for the voyage, they proceeded through the canal and into Cape Cod Bay despite knowing that the weather forecast called for seas that exceeded that limit. The pre-planning phase carried out by the captain, owner, and company proved to be ineffective. In particular, there were no safe harbors or alternate routes identified in case heavy weather should be forecasted during the voyage.

Figure 3. *Big Jake*, pier side before the accident.
SOURCE: SAFER TUG & BARGE

The probable cause of the capsizing and sinking of the *Dredge200* and the *R.E. Pierson 2* was the decision by the tow captain and owner to attempt a transit in forecasted wind and waves that exceeded their original plan for the voyage.

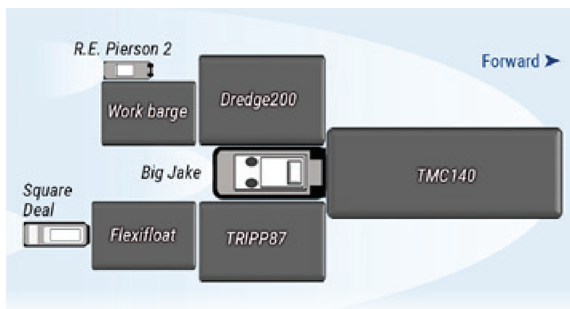


Figure 4. Representation (not to scale) of *Big Jake*'s tow arrangement of the five barges and two work boats during the majority of the voyage to Hingham Bay, Massachusetts.

Figure 5. *R.E. Pierson 2* before the accident.

Figure 6. *Dredge200* with excavator boom extended.

VOYAGE PLANS FOR PREVAILING WEATHER CONDITIONS
Owners and operators should develop voyage plans that assess prevailing weather conditions and anticipate changes along the intended route. Regardless of requirements, planning and preparation before a tow commences is critically important, including the identification of safe harbors along the route and adherence to operational limits.

ACCIDENT TYPE	VESSEL GROUP
CAPSIZING/LISTING	**TOWING/BARGE**

Capsizing of the Towboat ***Miss Roslyn***

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 142, NEAR RESERVE, LOUISIANA	
ACCIDENT DATE **OCTOBER 9, 2018**	REPORT NUMBER **MAB 19/33**
ACCIDENT ID **DCA19FM002**	ISSUED **NOVEMBER 13, 2019**

Figure 8. Sequence of events as the *Miss Roslyn* headed toward moored barges with a heavy list to starboard and eventually capsized. Left to right: (1) About 1650, the *Miss Roslyn* began crossing the Mississippi River with a noticeable list to starboard. As the vessel crossed the river, water increased on deck, and the vessel sank lower into the water. (2) The deckhands evacuate the *Miss Roslyn*. (3) About 1658, the vessel's list increases rapidly to starboard. (4) About 1659, the vessel lists further to about 90 degrees. SOURCE: CLAY HEBERT, ITV *KRISTY DUTSCH*

Figure 7. *Miss Roslyn*, preaccident.
SOURCE: MARQUETTE TRANSPORTATION COMPANY GULF-INLAND

On October 9, 2018, at 1630 local time, the fleet towboat *Miss Roslyn* was traveling downbound at mile 142 on the Lower Mississippi River near Reserve, Louisiana, when it began to flood and list to starboard. The three crewmembers abandoned the towboat onto a moored fleet barge and a Good Samaritan vessel. The *Miss Roslyn* capsized and sank on its starboard side. No injuries were reported. There was a visible oil sheen; containment booms and absorbent pads were placed around the vessel. Damages from flooding were estimated at $1,130,000.

On October 9, at 0500, the captain and two deckhands on the *Miss Roslyn* began their 12-hour workday on board the vessel at the Cooper Consolidated Inc. Upper Reserve fleeting area at mile 137.6 of the Mississippi River on the right descending bank. At 1000, the *Miss Roslyn* got under way upbound, and at 1100, the vessel arrived at the Terre Haute fleeting area near mile 144.5 to assist in building a tow.

At 1600, the two deckhands returned to the towboat, and about 1603, the vessel got under way, headed downbound and hugging the right descending bank. A short time later, the captain noticed a persistent list, and he made several round turns to starboard, which slightly reduced the list. After continuing the transit, he slowed the vessel at 1616 and reported his concerns to the port captain. The two deckhands reported that the aft starboard main deck was awash with 4–6 inches of water, and they could not safely open the manhole covers to the starboard steering and flanking voids. The captain ordered the deckhands to open the manhole covers to the port steering and flanking voids and dewater them with portable pumps.

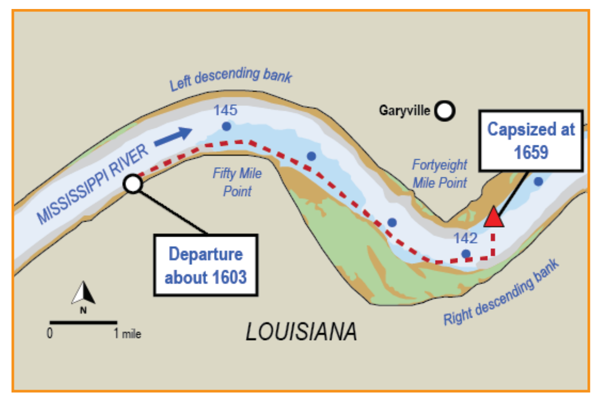


Figure 9. Trackline of the accident voyage. The *Miss Roslyn* capsized near mile 142 of the Lower Mississippi River, near Reserve, Louisiana.

At 1639, the captain stopped to inspect the vessel. He noted that the engine room was dry, but on the main deck, starboard side aft, water was coming through the freeing ports and had covered the deck about one foot; he made a second call to the port captain and radioed a nearby tug for assistance. About 1650, the ***Miss Roslyn*** began crossing the river to the left descending bank, making 8.7 mph speed over ground.

When the towboat was about 50 feet from an empty moored fleet barge on the left descending bank, the list increased to a slow roll to starboard. As soon as the ***Miss Roslyn*** touched the barge, the two deckhands jumped onto it, and the captain jumped onto a Good Samaritan towboat. At 16:59:11, the ***Miss Roslyn*** continued to roll over until the vessel came to rest on the river bottom.

On October 10, marine salvage contractors and divers arrived on scene to conduct an initial survey, and the vessel was refloated on October 14 and towed to a repair shipyard in Harvey, Louisiana.

Prior to the sinking, the ***Miss Roslyn*** was in drydock in June 2017 for maintenance and repairs to the hull. However, on November 16, a marine surveyor found two wastage holes and a fractured weld seam at the main deck to the starboard steering void, which therefore was not watertight. The captain stated that he was assisting in making up a tow, which required him to push against the tow at a 90-degree angle to the bank for 2.5 to 3 hours. This action, in combination with the current, likely would have lowered and intermittently submerged the wastage and fracture holes on the starboard stern quarter (which were normally just above the waterline) and allowed continuous water ingress to the starboard steering void for about 3 hours. As the ***Miss Roslyn*** got under way to head back for crew change, the aft steering void would have been partially flooded, which likely caused the observed starboard list. Once the hull flooded, the vessel sank lower, increasing the rate of flooding through the holes to the starboard steering void, thus increasing the starboard heel and submerging the starboard bulwark and then the stern deck. Eventually, the port flanking void flooded, resulting in the vessel's loss of stability and capsizing.

The severe wastage found throughout the vessel in the postaccident survey indicates that the ***Miss Roslyn*** was poorly maintained, so holes in and fractures to the hull and deck went undetected and ultimately led to flooding. An effective maintenance program would have prevented the holes from forming and made identification of hull fractures easier to see and flag for repair, or helped to determine when the vessel had outlived its useful service life.

The probable cause of the capsizing of the *Miss Roslyn* was the company's lack of effective hull inspection and maintenance program, which resulted in flooding into a steering void through multiple wastage holes in the hull.

Figure 10. The orange outline approximate location of a large hole along the seam between the *Miss Roslyn*'s starboard steering void and aft main deck; the hole is shown in the inset image.

EFFECTIVE HULL INSPECTION AND MAINTENANCE
To protect vessels and the environment, it is good marine practice for owners to conduct regular oversight and maintenance of hulls, including between drydock periods. Regardless of inspection requirements, owners are obligated to ensure vessels are properly maintained, equipped, and operated in a safe condition. Issues with watertight integrity and wastage need to be addressed by permanent means.

ACCIDENT TYPE	VESSEL GROUP
CAPSIZING/LISTING	**TOWING/BARGE**

Capsizing and Sinking of Towing Vessel ***Natalie Jean***

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 90.5, NEAR NEW ORLEANS, LOUISIANA	
ACCIDENT DATE **MARCH 12, 2018**	REPORT NUMBER **MAB 19/13**
ACCIDENT ID **DCA18FM017**	ISSUED **JUNE 4, 2019**

About 0938 local time on March 12, 2018, the towboat ***Natalie Jean*** was pushing an empty fuel tank barge *IB 1957* upriver on the Lower Mississippi River near New Orleans, Louisiana, when the towboat became caught on the port anchor chain of the anchored bulk carrier ***Atlantic Fairy***. The towboat capsized and quickly sank; the barge broke free and collided with the bulk carrier. Two of the three crewmembers on board the towboat died in the accident. Damage estimates exceeded $500,000.

The company that owned and operated the ***Natalie Jean***, was contracted to pick up a loaded fuel barge at mile 105, transit down to Stolthaven at mile 79, discharge the fuel from the barge, and bring the empty barge back. The company's usual captains were not available, so the owner contacted an acquaintance he had met earlier that week, who agreed to pilot the vessel. The pilot had more than 35 years experience as a mariner, but he had been retired for about a year and had not operated any commercial vessel for about 8 months. He was renewing his Coast Guard-issued credential, last issued in July 2013.

The company had implemented a TSMS in June 2016, outlining hiring processes, training, and familiarization requirements for crewmembers. Employees were required to complete an application, physical exam, and drug test. However, the owner did not request any pre-employment paperwork from the pilot and had no direct experience of the pilot's ability. In addition, the company required employees to review a deckhand orientation manual and receive an onboard vessel orientation. However, neither the owner nor the captain had the opportunity to provide the pilot with all the critical safety information.

About 1600 on March 11, the owner met the pilot at the vessel to discuss the voyage. It was the pilot's first time operating the ***Natalie Jean***, so he took time to familiarize himself with the vessel and its equipment, but he did not review emergency procedures or the tow's station bills.

Shortly thereafter, the ***Natalie Jean*** departed with the pilot at the helm and two other credentialed masters, one serving as captain and the other as deckhand. They arrived about 1830–1900, and the captain and deckhand discharged the load of fuel while the pilot slept. At 2021, NOAA issued a flood warning that the river level might rise further and make navigation and docking difficult.

Figure 11. *Natalie Jean* before the accident.
SOURCE: COAST GUARD

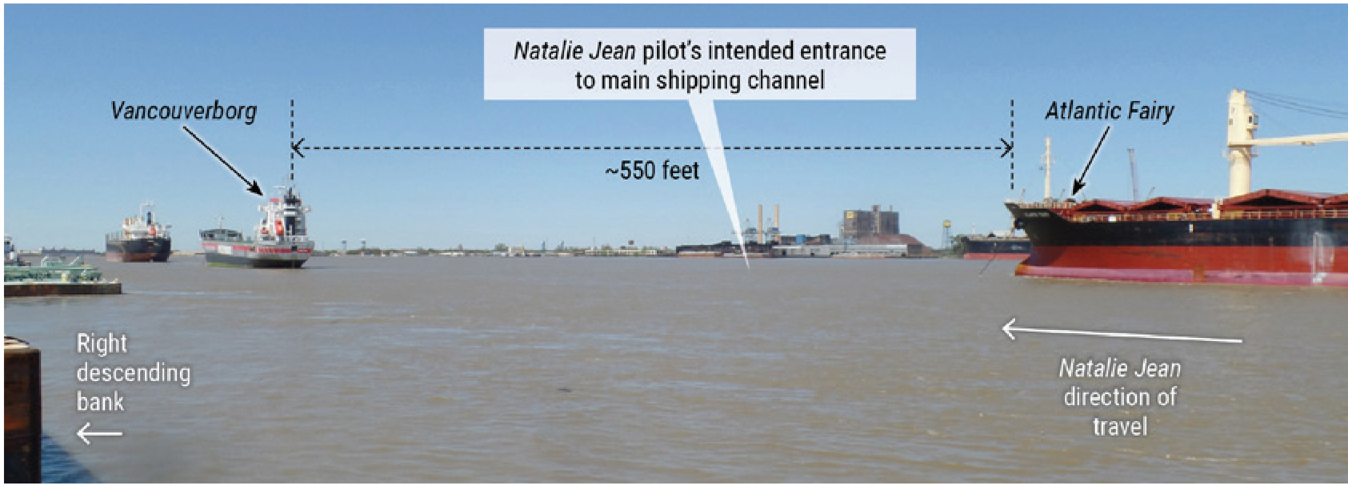


Figure 12. Photo taken from the towing vessel *Earl Gonsoulin*, moored along the right descending bank looking upriver.

About 0300 on March 12, the pilot relieved the captain. They did not discuss the flood warning, the current, or winds, although the company's TSMS stated that when the relief person comes on duty, they must exchange information related to tide, current, weather conditions, and other vessel information. The captain went down below, followed soon thereafter by the deckhand.

About 0500, the ***Natalie Jean*** departed with the empty barge. The pilot told investigators that the wind was blowing hard, and he transited to the west of the main shipping channel to better control the barge in the wind. About 0910, the ***Natalie Jean*** approached the New Orleans General Anchorage at mile 90.1. The pilot said that because the wind was pushing the tow toward the west (right descending) bank of the river, and because the channel was narrowing ahead due to fleeting operations at the Star Fleet fleeting area, he decided to return the tow to the main shipping channel. At a speed of about 1.5 mph, the pilot began a transit between two anchored deep-draft ships ahead on his starboard side: first, the bulk carrier ***Atlantic Fairy*** and about 550 feet after it the cargo ship ***Vancouverborg***.

He anticipated making a heading adjustment to starboard after passing alongside the port side of the ***Atlantic Fairy***. The barge ***IB 1957*** had cleared the ship's bow when he started maneuvers and heard the ***Atlantic Fairy***'s anchor chain catching on the towboat. The tow suddenly made a sharp turn to starboard and became pressed perpendicularly against the ***Atlantic Fairy***'s bow and its starboard anchor chain. The ***Natalie Jean*** subsequently heeled to port, and the port tow wire to the barge parted under tension. Seconds later, the ***Natalie Jean*** capsized and the barge broke free. The ***Natalie Jean*** quickly sank. The pilot was rescued from the water between the barge and the ***Atlantic Fairy***. The remains of the captain and the deckhand were not recovered until June 2018, when the vessel was salvaged from the river bottom.

In general, the company failed to comply with several of its own requirements, including pre-employment and postaccident drug and alcohol testing, hiring procedures, and ensuring that the pilot was thoroughly familiarized with the vessel prior to operating it unsupervised. The pilot's lack of vessel knowledge and experience, coupled with high water, strong winds, and a strong current placed him in a very challenging situation. His decision to transit upriver in the general anchorage, given the close proximity to both anchored and underway vessels, increased the navigational challenges and resulted in the contact with the ***Atlantic Fairy***'s chain.

The probable cause of the capsizing and sinking of the *Natalie Jean* was the company's decision to place an inadequately vetted pilot on board the vessel who did not have previous experience operating the *Natalie Jean*.

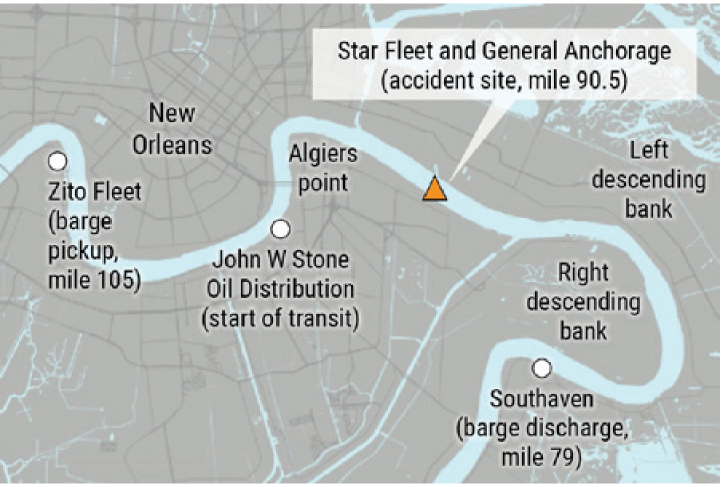


Figure 13. Map of the accident area near New Orleans. The site of the capsizing is overlaid by an orange triangle. Background source: Google Maps

Figure 14. Photo (looking upriver) of the *Natalie Jean* tow perpendicular to the *Atlantic Fairy*. The towboat has capsized and is sinking. Source: Moran Towing

ACCIDENT TYPE	VESSEL GROUP
CAPSIZING/LISTING	**FISHING**

Capsizing of Fish Tender *Pacific Knight*

LOCATION	
NUSHAGAK BAY, QUEENS SLOUGH AREA, ABOUT 11 MILES SOUTH OF DILLINGHAM, ALASKA	
ACCIDENT DATE	REPORT NUMBER
JULY 25, 2018	**MAB 19/23**
ACCIDENT ID	ISSUED
DCA18FM029	**AUGUST 2, 2019**

Figure 15. *Pacific Knight* in Nushagak Bay, about a month before the accident. SOURCE: WITNESS

Figure 16. Starboard quarter of the Pacific Knight. SOURCE: MIKE JONES

On July 25, 2018, about 0630 local time, the commercial fish tender Pacific Knight capsized while at anchor about 11 miles south of Dillingham, Alaska. Two of the three crewmembers on board were able to escape the vessel and were rescued by a nearby Good Samaritan fishing vessel. The third was unable to escape and drowned. About 1,439 gallons of fuel and 300 gallons of hydraulic oil were found on board, with an undeterminable quantity released in the water. The Pacific Knight, valued at $1.55 million, was declared a constructive total loss.

The *Pacific Knight* had a crew of three: the captain, who was also the vessel owner, and two deckhands. On July 24, the vessel was at anchor in Queens Slough in Nushagak Bay. Queens Slough had a large tidal range that brought strong currents, which caused the *Pacific Knight* to sheer back and forth with the current.

That evening around 1930, the fish tender *Amanda C* delivered four sacks of ice, each about 500 pounds, to the *Pacific Knight*. The ice was transferred using the knuckle crane on the *Pacific Knight*'s starboard side. With each hoist, the vessel would noticeably list to starboard. Within the hour, the stern sank so deeply that the vessel's name on the stern could no longer be seen. By the time the loading was complete, the freeing ports at the main deck at the mid-section of the vessel were under water as well.

While at anchor, about 0530, the captain did a walkthrough of the boat, and deemed all was satisfactory. Afterwards, he went back to the wheelhouse, where he lay down on the day bunk and fell asleep. Both deckhands were sleeping below.

The captain was awakened when he rolled off the day bunk and landed in water on the port side of the wheelhouse. The vessel was lying on its port side and began to flood quickly, so the captain climbed up the starboard side of the wheelhouse and kicked the door open. Once outside, he found himself in the water and was swept under the anchor line as he cleared the rigging.

On board the *Amanda C*, a deckhand on watch noticed the *Pacific Knight* capsizing to port and sinking about 0630. He woke the captain, who saw from the wheelhouse nothing but debris and the starboard stern corner of the *Pacific Knight* above the water. He woke the captain, who upon arriving in the wheelhouse ordered his two deckhands to prepare to haul the anchor. He then noticed the captain of the *Pacific Knight* in the water and had the deckhands pick him up. They headed toward the *Pacific Knight* to search for the missing crewmembers. The younger deckhand was spotted and pulled aboard. The search then continued for the senior deckhand, but he was not found.

At 0747, an Alaska state trooper and a wildlife trooper were notified and dispatched a patrol boat to the accident scene, where they took initial statements from the two survivors. The troopers departed with the captain and deckhand about 1034. Coast Guard aircraft and Good Samaritan vessels continued the search until about 1556. The wreckage was recovered on August 29. The body of the missing deckhand was found in the galley area under a table; the cause of death was drowning.

At the time of the accident, the vessel was likely overloaded. In addition to the sacks of ice, there was about 1 ton of ice in the aft fish hold, and the main fish hold was about three-quarters full of seawater. While at anchor prior to the accident, the vessel had a very small freeboard and a stern trim that submerged the vessel's name on the transom. A vessel operated at a deeper draft typically has less stability than when operated at a lesser draft due to a reduction in righting energy; it also has a lower range of stability, since seawater can enter any openings and downflood into compartments at lower angles of heel. Excessive stern trim also reduces righting energy and makes downflooding through aft openings occur earlier. As such, with slack water in the main fish hold, a heeling moment on the vessel from an external force would have likely induced a list, which would have caused water in the fish hold to flow to the low (port) side of the vessel, and this free-surface effect would have been detrimental to stability.

The last stability assessment of the *Pacific Knight* was conducted in 1996 and would not have included any vessel modifications completed since then. The weight and placement of the two cranes that the captain added to the *Pacific Knight* about a month before the sinking likely increased the vessel's vertical center of gravity. Though not required, once the vessel was substantially modified by removing and adding equipment, a revised stability assessment should have been conducted to give the captain the necessary information to safely load the vessel.

Figure 17. Left: the *Pacific Knight* while moored alongside a dock on June 10, 2018, with the two added cranes. Below: undated photo of the *Pacific Knight* (then named the *Lone Fisherman*) with the aft deckhouse that was removed (highlighted in yellow). Source: Lone Fisherman, LLC

The probable cause of the capsizing of fish tender *Pacific Knight* was the captain's inadequate assessment of the vessel's stability and the risks related to vessel modifications, slack water in the tanks, and overloading of the vessel.

Figure 18. *Pacific Knight* while it was salvaged, with its crane positions visible in the inset.
Source: Resolve Magone

Figure 19. *Pacific Knight* postsalvage.
Source: Coast Guard

ACCIDENT TYPE	VESSEL GROUP
COLLISION	**FISHING**

Collision between Fishing Vessels ***Got 'M On*** and ***Lady Toni***, and Subsequent Sinking of ***Got 'M 'On***

LOCATION	
GULF OF MEXICO, NEAR PORT O'CONNOR, TEXAS	
ACCIDENT DATE **JULY 28, 2018**	REPORT NUMBER **MAB 19/22**
ACCIDENT ID **DCA18FM031**	ISSUED **JULY 31, 2019**

Figure 20. *Got 'M On*, preaccident. SOURCE: CLAY VOSS

Figure 21. *Got 'M On*, shortly after the collision. SOURCE: JOHN HAFERNICK

On the afternoon of July 28, 2018, the sportfishing vessel ***Got 'M On*** collided with the commercial fishing vessel ***Lady Toni*** about 105 miles east of Corpus Christi, Texas. The ***Got 'M On*** began flooding and all eight persons aboard disembarked to a Good Samaritan vessel before the sport-fishing boat sank. No pollution or injuries were reported. The value of the ***Got 'M On*** was $1.2 million and damage to the ***Lady Toni*** was about $250,000.

The ***Got 'M On*** left Port O'Connor, Texas, on Thursday, July 26, 2018, about 1700, and headed east, about 128 miles, to the ***Hoover-Diana*** spar platform, with a total of eight persons aboard to participate in a fishing tournament. One of the persons served as captain and another as mate. On July 28, about 0930, they hooked a blue marlin and fought it until about 1300, when they hauled the marlin on board.

The captain, navigating the ***Got 'M On*** from the flying bridge, commenced the return to have the marlin weighed in Port O'Connor. About 1530, the captain overtook the sportfishing vessel ***Double Oak***, which was also participating in the tournament, on that boat's starboard side. No one else was with him on the flying bridge, and the only vessel he recollected seeing, visually or by radar (set to a 6-mile range), was the ***Double Oak***. With the vessel's speed about 28 knots, he set the vessel to autopilot and went below to perform a visual check of the engines, which he said took about 45 seconds. Instead of heading back to the flying bridge, he proceeded to the salon to talk for about 2–3 minutes to the owner about the marlin they had caught. While talking to the owner, he saw the tip of an outrigger appear in the starboard window to the salon. Immediately afterward, at 1548, the vessels collided and, according to the captain, the ***Got 'M On***'s port bow area began taking on water. The flying bridge structure and tuna tower of the ***Got 'M On*** toppled to the water. The captain of the ***Got 'M On*** had the passengers head to the stern of the vessel.

Both ***Double Oak*** deckhands said that force of the

Got 'M On striking the ***Lady Toni*** lifted the sportfishing vessel about 3–4 feet into the air. The ***Double Oak*** circled back, and, less than 10 minutes after the collision, the eight persons on board disembarked from the stern directly onto the ***Double Oak***. Shortly thereafter, the ***Got 'M On*** sank.

Collision regulations require all vessels to keep a proper lookout and to proceed at a safe speed. It is likely that the captain spent longer than 2–3 minutes off the flying bridge, given that he should have seen the ***Lady Toni*** visually or by radar well in advance of the collision. The captain should not have left the navigation bridge unattended, especially not while operating at such a high rate of speed.

The ***Lady Toni*** captain stated that about 5 minutes before the collision, they noticed the ***Got 'M On*** about 5–6 miles away approaching them. After the deckhand and the captain confirmed the vessel's continued approach on the radar, they discussed turning the ***Lady Toni*** to port. The captain stated that he tried calling the other vessel four or five times on VHF channel 16 but received no answer and twice exited the starboard wheelhouse door, first to look at the approaching vessel and second to "flag" it but saw no one on board. About 30 seconds before impact, the ***Lady Toni*** crew realized they were going to hit and, according to the wheelhouse deckhand, the captain slowed the vessel and turned it to port. However, both of the ***Double Oak*** deckhands stated that they saw no one on the decks or at the conning stations of either vessel, that neither the ***Got 'M On*** nor the ***Lady Toni*** changed course or speed, and that they heard no radio transmission from either vessel. Regulations require the "give-way" vessel (the ***Lady Toni***, because the ***Got 'M On*** was crossing from the ***Lady Toni***'s starboard side) to take action to prevent a collision. Additionally, if any vessel is in doubt of what the other vessel is doing, it must sound the danger signal. If the ***Lady Toni*** captain had detected the ***Got 'M On*** 5–6 miles away, he should have taken action to avoid the collision.

The probable cause of the collision between sportfishing vessel *Got 'M On* and commercial fishing vessel *Lady Toni* was the failure of the *Lady Toni* captain to take appropriate action to avoid the collision, and the *Got 'M On* captain's failure to safely operate his vessel by leaving the bridge unattended.

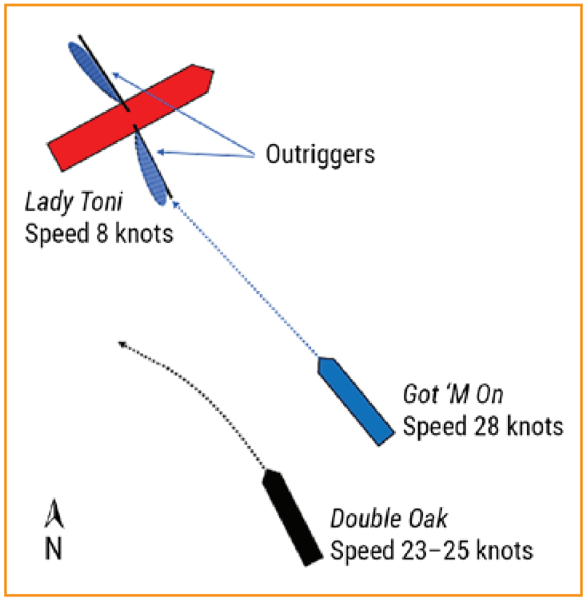


Figure 22. Approximate positions of vessels prior to collision (not to scale).

Figure 23. *Lady Toni* dockside, postaccident.

Figure 24. The starboard (damaged) side of *Lady Toni*.

ACCIDENT TYPE	VESSEL GROUPS
COLLISION	**GOVERNMENT** **TANKER**

Collision between US Navy Destroyer ***John S McCain*** and Tanker ***Alnic MC***

LOCATION	
SINGAPORE STRAIT, 5 MILES NORTHEAST OF HORSBURGH LIGHTHOUSE	
ACCIDENT DATE **AUGUST 21, 2017**	REPORT NUMBER **MAR 19/01**
ACCIDENT ID **DCA17PM024**	ISSUED **JUNE 19, 2019**

Figure 25. The *John S McCain* postaccident arriving in Singapore. SOURCE: US NAVY

On August 21, 2017, the US Navy destroyer ***John S McCain*** was overtaking the Liberian-flagged tanker ***Alnic MC*** while both vessels were transiting the westbound lane of the Singapore Strait Traffic Separation Scheme. The destroyer crew had a perceived loss of steering, and, while the crew attempted to regain control of the vessel, the ***John S McCain*** unintentionally turned to port into the path of the ***Alnic MC***. At 0524, the vessels collided. As a result of the collision, 10 ***John S McCain*** sailors died, 48 were injured, and the vessel sustained over $100 million in damage. No one was injured on the ***Alnic MC***, and the vessel sustained about $225,000 in damage. There was no report of pollution.

As the twin-propeller, twin-rudder ***John S McCain*** was transiting the Traffic Separation Scheme prior to the accident, it was making a speed of 18 knots and overtaking several slower vessels. A single crewmember was controlling both steering and propeller thrust from the helm station at the SCC, as ordered by an officer assigned to control maneuvering of the ship.

About 0520, the destroyer's commanding officer, who was on the bridge, thought that the helmsman might become overwhelmed responding to steering and thrust commands as the ship maneuvered in the busy shipping lane. Consequently, he ordered a second watchstander—a lee helmsman—to take over control of the ship's propeller thrust. Once the lee helmsman was in place, the controls for thrust had to be transferred from the helm station to the lee helm station on the SCC.

When the lee helmsman attempted to transfer control, he transferred control of the port propeller thrust to the lee helm station, but also inadvertently transferred control of steering. The ship's steering system had been in "backup manual mode," which had allowed him to take steering control unilaterally without the knowledge or input of the helmsman. The written operating procedures on board did not describe the actions needed to transfer thrust control between stations.

Soon after, the helmsman reported that he had lost control of steering. The first step in the emergency procedure for a loss of steering required the helmsman to depress an "emergency-override-to-manual" button on the SCC. When depressed, this button shifted the steering mode to backup manual (if in a mode other than backup manual) and also transferred steering to the helm station. However, because the system was in backup manual mode, the OOD skipped the first step in the emergency procedure, and control of steering remained at the lee helm station, unbeknownst to the bridge crew. Without steering control, the helmsman could not maintain the ***John S McCain's*** heading, and the vessel began to slowly turn to port.

Figure 26. *Alnic MC* anchored in Singapore postacident. Source: Coast Guard

About a minute later, control of the starboard propeller thrust was transferred to the lee helm station. Soon after, the OOD ordered the ship's speed reduced to 10 knots and then to 5 knots. The lee helmsman believed that the touch screen throttle controls for both propellers were linked, so that the movement of one throttle simultaneously moved the other throttle the same amount. Thus, when ordered to slow the ship, the lee helmsman reduced power on the port throttle expecting both throttles to reduce in speed. However, the throttles were not linked, and only the port engine slowed. This created asymmetric thrust which further increased the vessel's turn to port.

And after efforts to regain control of steering on the *John S McCain* bridge failed, watchstanders in aft steering were ordered to take control. They took control, but control shifted quickly back to the bridge. Bridge crewmembers, who were unfamiliar with the steering system, had pressed the emergency-override-to-manual button thinking that it would shift control to aft steering. Instead, this action returned control back to the bridge. After some confusion, the aft steering watchstanders retook control of steering, but during the struggle to regain it, the destroyer's speed progressively decreased while its rate of turn to port increased, bringing the ship across the TSS lane in an increasingly tighter turn.

The tanker *Alnic MC* had been transiting in the westbound lane of the TSS off the destroyer's port side at about 10 knots. No VHF warning had been broadcast by the *John S McCain*—although it was a requirement of the ship's emergency procedure—and, as the destroyer began turning toward his vessel, the *Alnic MC* master initially assumed that the Navy ship would pass ahead of his ship. However, as the destroyer continued to turn into the path of the *Alnic MC*, the master became increasingly concerned, and consequently he reduced the tanker's engine from full ahead to half ahead at 05:23:44.

Once control of the *John S McCain*'s steering was reestablished in aft steering, the rudders were moved to 15 degrees to starboard. However, this action and the action of the *Alnic MC* master to slow his vessel were not enough to prevent a collision, and, at 05:23:58, the bow of the tanker struck the port side of the destroyer.

The probable cause of the collision between the destroyer *John S McCain* and the tanker *Alnic MC* was a lack of effective operational oversight of the destroyer by the US Navy, which resulted in insufficient training and inadequate bridge operating procedures. Contributing to the accident were the *John S McCain* bridge team's loss of situation awareness and failure to follow loss of steering emergency procedures, which included the requirement to inform nearby traffic of their perceived loss of steering. Also contributing to the accident was the operation of the steering system in backup manual mode, which allowed for an unintentional, unilateral transfer of steering control.

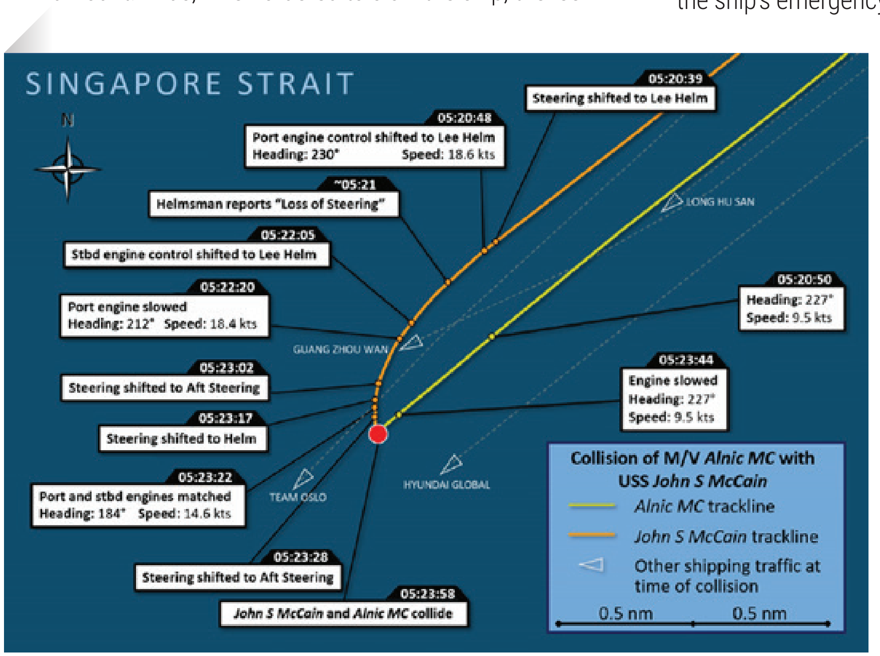


Figure 27. Vessel tracks and accident events.

Figure 28. Portside damage to *John S McCain* caused by the bow of *Alnic MC*. Source: US Navy

ACCIDENT TYPE	VESSEL GROUPS
COLLISION	**FISHING** **TANKER**

Collision between Fishing Vessel *Polaris* and Tanker *Tofteviken*

LOCATION	
ATLANTIC OCEAN, ABOUT 30 MILES SOUTH OF MONTAUK, LONG ISLAND, NEW YORK	
ACCIDENT DATE **MAY 12, 2018**	REPORT NUMBER **MAB 19/17**
ACCIDENT ID **DCA18FM023**	ISSUED **JUNE 28, 2019**

On May 12, 2018, about 1913 local time, the fishing vessel *Polaris*, transiting with a crew of 6, and the tanker *Tofteviken*, with a crew of 25, collided about 30 miles south of Montauk, Long Island, New York, during daylight and good visibility. There were no reports of pollution or injuries. Both vessels sustained hull damage amounting to $716,047.

On the morning of May 12, the fishing vessel *Polaris* began the transit from fishing grounds off the coast of New Jersey toward New Bedford, Massachusetts at a speed of about 10 knots. At 1600, the captain was relieved by the mate.

During his watch, the mate began cleaning the pilothouse, which was routine during the transit back to port. He left the pilothouse to get cleaning supplies, but before doing so, he checked the vessel's two radars; he did not see anything.

The *Tofteviken* was also on autopilot, making a westerly course at a speed of about 10.5 knots. Between 1850 and 1855, the third mate noticed the *Polaris* on radar on the port bow, about 8 miles away. She stated that the *Polaris* seemed to have altered its course to starboard, prompting her to place an EBL on the vessel using the ARPA. She did not acquire the *Polaris* on the ARPA.

About 1858, the third mate radioed the AB on duty to request that he come to the bridge to stand lookout. Both he and the third mate stated that they had visual contact with the *Polaris* ahead of them and to port, and they believed that the *Polaris* had changed course.

Figure 30. Fishing vessel *Polaris* before accident.
SOURCE: EASTERN FISHERIES

At 1907, the distance between the *Tofteviken* and *Polaris* had decreased to 1.8 miles. According to the master's standing orders and company guidelines, the officer of the watch was required to maintain a minimum 2 nautical miles distance to other vessels and alert the master if the time to the closest point of approach was less than 20 minutes. About 3 minutes later, the distance between the vessels decreased further, to about 0.8 miles. The chief engineer, who was on the bridge with the master for non-navigational reasons, noticed the Polaris at close range on the port bow and shouted to the third mate, "What are you doing?" The master immediately ordered hand steering and hard to starboard and directed the second officer to sound the ship's whistle. Seconds later, at 1913 the two vessels collided.

Figure 29. Main damage area of hull of *Tofteviken*.
SOURCE: COAST GUARD

On board the *Polaris*, the mate said he was cleaning when he heard a sound and turned around to see "a wall of green" in front of him. He attempted to turn the vessel to starboard, but the bow of the *Polaris* struck the port side of the tanker. The *Polaris* mate said that he had been monitoring channels 16 and 22A but did not hear any calls or any sound signals from the *Tofteviken*. He last looked out the windows and at both the radars about 15 minutes before the collision. After the collision, the master of the *Tofteviken* and the captain on the *Polaris* assessed damage and reported the collision to the Coast Guard.

Figure 31. Area of greatest damage to hull of *Polaris*.

Maintaining a proper lookout, by sight and sound, is a fundamental rule of the *COLREGS* for vessels on the high seas. Yet, the *Polaris* mate on watch was occupied with a cleaning task and therefore did not keep a proper lookout or notice any danger or risk of collision.

The mate stated that occasionally he would leave the pilothouse unattended. This practice, accepted by the captain as well as by the company, did not promote effective watchkeeping and distracted the mate from maintaining a proper lookout. Further, although the mate on the *Polaris* had radar available, he checked it at infrequent intervals and without the use of long-range scanning, which, collectively, could have alerted him to the developing collision course with the tanker.

The third mate on the *Tofteviken* did not use all available means to determine the risk of collision. Although she identified the fishing vessel visually and by radar, she did not adhere to company policy that required her to utilize the ARPA and radar guard rings, and investigators found no evidence that she monitored the progress of the vessel in relation to the EBL. Furthermore, she did not follow the master's standing orders and company policy that required her to notify the master of their proximity to the *Polaris*. Had she followed the master's standing orders, the accident could have been avoided.

The probable cause of the collision between the fishing vessel *Polaris* and the tanker *Tofteviken* was the failure to maintain a proper lookout by the mate on the fishing vessel and the failure to identify the risk of collision by the third mate on the tanker.

Figure 32. *Polaris* dockside.

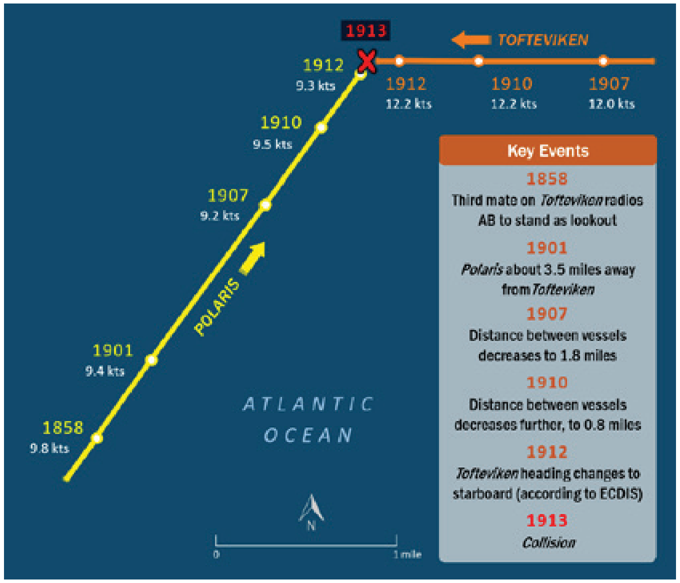


Figure 33. Tracklines of *Polaris* and *Tofteviken* leading up to collision, based on AIS data.
Background Source: Google Maps

EARLY COMMUNICATION

Early communication can be an effective measure in averting close quarters situations. The use of VHF radio can help to dispel assumptions and provide operators with the information needed to better assess each vessel's intentions.

PROPER LOOKOUT

Non-navigational routines should never interfere with the primary task of a watchstander or a bridge team member to maintain a proper lookout. Should performance of another task or duty be necessary, an extra lookout should be posted.

ACCIDENT TYPE	VESSEL GROUPS
COLLISION	**TOWING/BARGE** **RECREATIONAL**

Collision of Sand Barge ***Weeks 207***, Pushed by Tugboat ***Seeley***, with Sailboat ***Sea Jay***

LOCATION	
WEST BRANCH STAMFORD HARBOR, STAMFORD, CONNECTICUT	
ACCIDENT DATE **SEPTEMBER 17, 2018**	REPORT NUMBER **MAB 19/31**
ACCIDENT ID **DCA18FM039**	ISSUED **NOVEMBER 7, 2019**

Figure 34. Tugboat *Seeley* before the accident.
SOURCE: WEEKS MARINE

Figure 35. Catamaran *Sea Jay*, the vessel with a red main sail cover, seen docked at the end of Hinckley pier after the accident. SOURCE: COAST GUARD

On September 17, 2018, about 0826 local time, the tugboat ***Seeley*** with a crew of five was upbound on the West Branch of Stamford Harbor, Connecticut, pushing two sand barges, when the lead barge struck the stern of the moored sailboat ***Sea Jay*** during a tripping maneuver. The ***Seeley*** continued with both barges to its destination and the ***Sea Jay*** remained afloat at its mooring. No injuries were reported. Minor oil pollution originated from the ***Sea Jay***; damage to the sailboat amounted to $300,000.

At 0755, the towing vessel ***Seeley*** picked up two loaded sand barges, ***Weeks 207*** and ***Weeks 213***, from the Stamford Mooring for delivery 1.3 miles away. Within 21 minutes of leaving the mooring, the tow entered the West Branch of Stamford Harbor, which measures approximately 600 feet between its opposite shores, although marina piers and docks lining both sides narrow the waterway to as little as 130 feet.

During the transport of the barges, the mate decided to employ a tripping maneuver by having the deckhands release tow wires on one side between the two barges, which allows the lead barge to swing until it comes alongside the barge behind it as the tow continues to move ahead. When the tow was about 750 feet from the terminal and just as the bow of the lead barge entered a section of the branch where the width between docks on each side increased from 150 to 190 feet, the mate ordered the deck engineer and the deckhand to let go the starboard lines connecting the two barges to each other. As the tugboat and ***Weeks 213*** slowly moved forward, ***Weeks 207***—which was still connected to ***Weeks 213*** on the port side—slowly swung to port. The deck engineer went to the port side of ***Weeks 213*** and provided the mate with distances between the swinging ***Weeks 207*** and the vessels and piers on the port side of the tow, including the sailboat ***Sea Jay***, now directly off the tow's port side.

At 0835, less than 2 minutes after the mate ordered the lines let go, the port bow of ***Weeks 207*** swung to port, striking the port side of the ***Sea Jay*** at its stern and damaging the fiberglass hull. The impact pressed the ***Sea Jay*** against the dock on the sailboat's starboard side, causing movement of the floating pier, its finger piers, and four vessels moored to the dock. As the ***Seeley*** continued moving ahead, the barge came away from the ***Sea Jay*** and continued swinging to port.

The tripping maneuver continued until the barges were brought together. The mate did not want to obstruct other vessel traffic, so he continued with both barges to the terminal and moored them. The collision damaged an oil line on the ***Sea Jay***. Oil spilled into the bilge, mixed with water, and was pumped overboard by one of the vessel's automatic bilge pumps. Responders contained the spill with absorbent boom and removed the oil using absorbent pads. The ***Sea Jay*** was towed that same day to a boatyard for repairs.

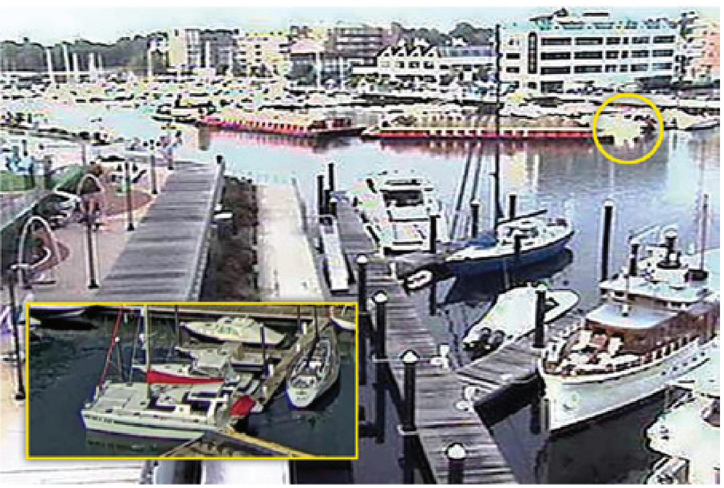


Figure 36. Surveillance footage of (top) *Seeley* with *Weeks 213* and the separated *Weeks 207* angled and moving toward the *Sea Jay* (circled). Inset: Port forward corner of *Weeks 207* at the moment it falls away from the *Sea Jay*. Source: Coast Guard

Although the mate had attempted and successfully completed this maneuver before, the relatively narrow channel compared to the width of the two barges and the nearby piers and private vessels moored on either side made conducting a tripping maneuver in this location risky. The mate did use a formal Job Safety Analysis, but the analysis did not address the piers and moored vessels in the West Branch. The mate was likely aware of the ***Sea Jay*** being moored at the pier on the west side of the river because the sailboat was clearly visible and also had been there during his previous transit less than 2 hours earlier. The sailboat's beam was nearly twice the width of a conventional single-hulled vessel of similar length, but the mate did not account for the wider beam of the catamaran.

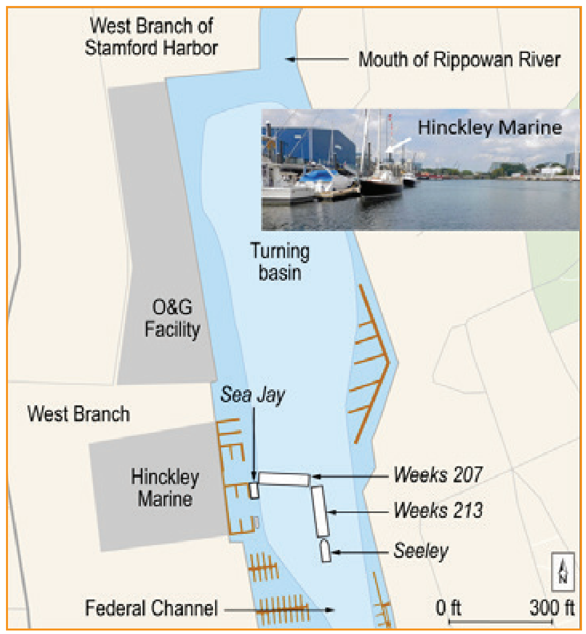


Figure 37. Rendition showing the approximate position of barge *Weeks 207*, pushed by tugboat *Seeley*, striking sailboat *Sea Jay*. Background source: Google Maps

The probable cause of the collision of sand barge *Weeks 207*, pushed by tugboat *Seeley*, with sailboat *Sea Jay* was the *Seeley* mate's decision to perform a tripping maneuver in a narrow channel near surrounding piers and docked vessels, despite the availability of an appropriate turning basin only about a tow length ahead.

Figure 38. Sailboat *Sea Jay* anchored before the accident. Source: *Sea Jay*

ACCIDENT TYPE
COLLISION

VESSEL GROUPS
CARGO
TOWING/BARGE

Collision of Bulk Carrier *Yochow* with Articulated Tug and Barge *OSG Independence/ OSG 243*

LOCATION
HOUSTON SHIP CHANNEL, HOUSTON, TEXAS

ACCIDENT DATE	REPORT NUMBER
JUNE 13, 2018	**MAB 19/08**
ACCIDENT ID	ISSUED
DCA18FM026	**APRIL 23, 2019**

Figure 40. The *Yochow* at port, following the accident.

Figure 39. Damage to *OSG 243*, port side. Yellow circles identify, at top, cantilever deck damaged by *Yochow*'s bow rake and, at bottom, side shell at waterline in no. 5P ballast tank penetrated by bulk carrier's bulbous bow.

At 0250 local time on June 13, 2018, the inbound bulk carrier *Yochow* collided with the articulated tug and barge *OSG Independence/OSG 243*, which was moored at the TPC Group, Inc. facility on the Houston Ship Channel in Houston, Texas. *OSG 243*'s tanks were empty and awaiting a cargo of methyl tertbutyl ether (MTBE). As a result of the collision, two of the barge's tanks and *Yochow*'s bulbous bow were holed, and the facility suffered extensive structural damage. There were no injuries among the crew of 18 on the *Yochow* or the 8 aboard the tug *OSG Independence*, nor was any pollution reported. Damage to the facility ($20 million), the barge ($1 million), and the bulk carrier ($338,000) amounted to an estimated $21,338,000.

On June 12, the articulated tug and barge *OSG Independence/OSG 243* arrived at the TPC facility and moored starboardside to in order to load MTBE. Cargo operations had not yet commenced.

A Houston pilot boarded the *Yochow* outside of Galveston at the pilot station. The second mate and a helmsman relieved the watch at midnight. This helmsman manually steered from the time he came on watch at 2345 until several hours later—without relief.

The Houston Ship Channel makes an approximate 100-degree turn to port at Lynchburg Landing. At 0115, the pilot gave a port 20 degrees command to start this turn. The helmsman answered, "Port 20," but put the helm 20 degrees to starboard. The pilot caught the error and ordered, "Midships," then repeated the port-20 order. The bridge team was able to stop the vessel's swing to starboard about 38 seconds after the original command to port. The pilot and second mate had a brief conversation, and the second mate agreed to doublecheck the helmsman with each command.

The *Yochow* approached the turn at Sims Bayou about 90 minutes later. The pilot planned to turn wide at Sims Bayou, intending to stay to the south side of the channel to pass a dredge operating in the channel. The pilot gave a port 20 degrees command to bring the ship slightly left, ahead of the turn, and the helmsman answered accordingly. His next order 24 seconds later was "hard starboard" to make the turn. The helmsman repeated the pilot's order but immediately put the rudder hard to port.

Ten seconds later, the pilot recognized the error and ordered midships. It took the steering gear 15 seconds to shift to midships, and then the pilot repeated his original hard starboard order. The rudder reached hard starboard 12 seconds later, although the ship's heading was still falling to port at about 12 degrees per minute.

About 48 seconds after the original order to starboard, the *Yochow* was about one ship's length away from the *OSG Independence/OSG 243*, and the pilot ordered, "Stop engines. Let go anchor." He followed this order with full astern 7 seconds later and then ordered the whistle sounded. With the port anchor and two shots of chain deployed, the *Yochow* collided at approximately 4.5 knots with the port side of the tank barge *OSG 243* amidships at 02:49:45, damaging the barge, which in turn damaged the wharf.

Twice during the transit, the pilot gave a rudder order that the helmsman correctly repeated, yet he turned the wheel in the opposite direction. In both cases, the pilot noted the error and took action to direct the helmsman to correct the rudder. Bridge resource management is an industry standard for using all available resources to safely execute a vessel's passage plan, and requires all involved to maintain situational awareness and share information freely to address contingencies. Included in this concept is the expectation for the officer of the watch to check the rudder angle indicator with each helm order and the rpm indicator with each ordered change of speed. The mate on watch did not notice or correct the helmsman during the two steering errors.

The helmsman stated that he performed work that was not reflected in the log, so he would not have met work/rest requirements, and at the time of the accident, he had been at the wheel continuously for almost 3 hours and was likely fatigued. Failure to adhere to work/rest guidelines can lead to fatigue and thereby can impair a crewmember's alertness and ability to safely operate a vessel or perform safety-related duties.

The probable cause of the collision of the bulk carrier *Yochow* with the tank barge of the articulated tug and barge *OSG Independence/ OSG 243* was the mate's failure to effectively monitor the helmsman, contrary to the principles of good bridge resource management. Contributing to the accident was the lack of company and shipboard oversight to ensure crewmembers adhered to work/rest guidelines, resulting in fatigue of the helmsman.

MANAGING FATIGUE

Fatigue impacts every aspect of human performance, including decisionmaking, reaction time, and comprehension, all of which affect seafarers' ability to safely navigate. Having fatigued crewmembers in critical positions when navigating a busy channel increases the probability of errors that lead to incidents. Companies should include fatigue management procedures in their safety management systems and ensure compliance with applicable work/rest requirements.

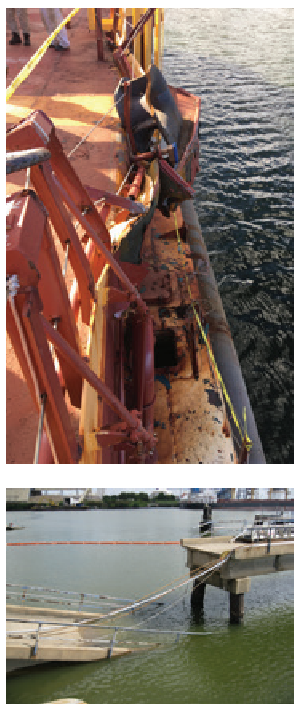
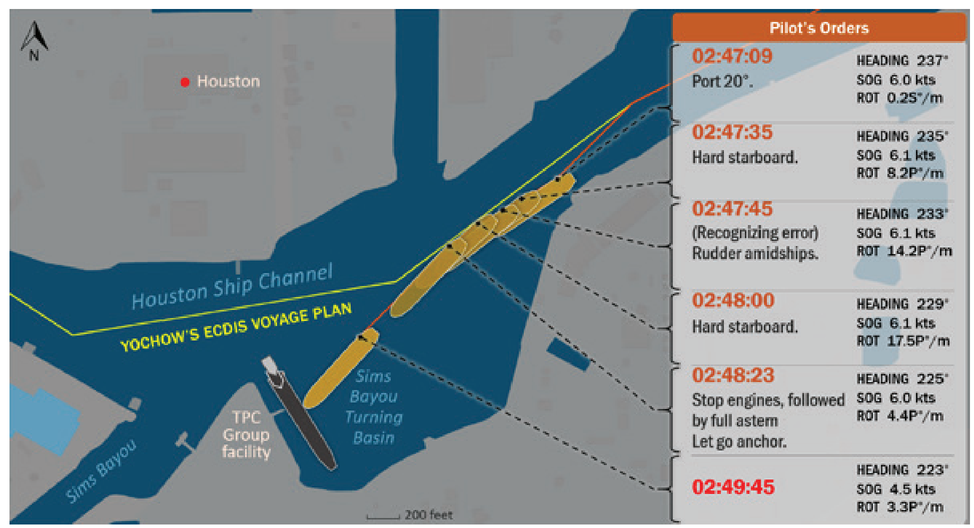


Figure 41. Left: *OSG 243*'s port side damage and facility's pedestrian bridge damage.

Figure 42. Below: According to electronic data, last 10 minutes of *Yochow*'s trackline leading up to accident based on pilot's orders.
BACKGROUND SOURCE: GOOGLE MAPS



ACCIDENT TYPE	VESSEL GROUP
CONTACT	**TOWING/BARGE**

Contact of the ***Andrew Cargill MacMillan*** Tow with Grain Conveyor

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 442.4, NEAR TALLULAH, LOUISIANA	
ACCIDENT DATE **OCTOBER 23, 2018**	REPORT NUMBER **MAB 19/37**
ACCIDENT ID **DCA19FM004**	ISSUED **DECEMBER 3, 2019**

On October 23, 2018, about 1426 local time, the towing vessel *Andrew Cargill MacMillan* was pushing 42 loaded barges southbound on the Lower Mississippi River, near Tallulah, Louisiana. While rounding a bend, the tow touched bottom, resulting in the head of the tow contacting breasting dolphins and a conveyor at the Farmers Grain Terminal at mile 442.4. The conveyor was destroyed, and the dolphins and a lead barge were damaged. There were no injuries to the ten crew on board or anyone ashore. There was no release of pollutants. Damage was estimated at $8 million for the conveyor and dolphins and about $74,000 for the barge.

On the afternoon of October 23, the pilot of the *Andrew Cargill MacMillan* was working his scheduled afternoon watch. Although the vessel was equipped with radar and an electronic charting system, the pilot was navigating solely using visual references in the river.

About 1410, at a speed of about 9.5 mph over ground, the pilot began to steer the bend at mile 445, a turn to port, toward a line of three red, conical buoys marking shallow water on the left descending bank. About a minute later, he lost sight of the closest red buoy, but sighting an object in the area and thinking it was the buoy, he steered the vessel toward it. By the time he noticed the red buoy popping up from under the water, the head of the tow was in the center of the river and the trough of the current and had "slid out of the turn," with the current pushing the vessel and tow towards the right descending bank. The pilot applied hard rudder to steer the tow to port toward the left descending bank.

About 1418, the vessel began to slow because of "dead water" near the right descending bank. The aftermost barge on the starboard side of the tow struck the bottom about 1421, causing the head of the tow to veer to starboard towards the Farmers Grain Terminal (mile 442.4), which had four steel-pile breasting dolphins in the river with a conveyor and catwalk to the shore.

Figure 43. *Andrew Cargill Macmillan* before the accident. SOURCE: ARTCO

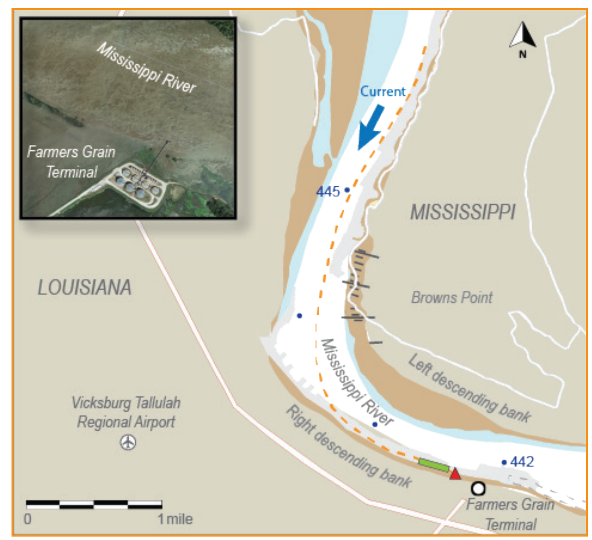


Figure 44. Trackline of the *Andrew Cargill MacMillan* showing the vessel's course from north of mile 445 to the accident location at Farmers Grain Terminal.
INSET SOURCE: GOOGLE EARTH

About 1426, the barges at the head of the tow contacted the breasting dolphins and grain conveyor. Two dolphins and the conveyor were knocked over. Once the vessel came to a stop, the pilot used the flanking rudders and astern propulsion to keep the stern of the tow off the bank. The tow remained on the bank at the site of the contact until the next morning, when the vessel departed and resumed its voyage with all but three of the barges.

The pilot relied on visual means to navigate the vessel and tow in a sharp bend by using buoys. He momentarily lost sight of the red buoy and mistakenly steered on an object drifting in the area. By the time the buoy had re-appeared and the pilot realized his mistake, the tow was in the center of the river and sliding towards the right descending bank. Although steering vessels by visual reference is a primary means to navigate in western rivers, there was equipment on the vessel that could have aided in cross-checking the vessel's position and rate of turn in the bend. Had they been effectively used, the pilot may have been able to detect that he was out of position earlier, thus allowing him to keep the tow from further sliding into the bend.

The probable cause of the contact of the tow of the *Andrew Cargill MacMillan* with the Farmers Grain Terminal breasting dolphins and conveyor was the pilot's overreliance on floating aids to navigation, which resulted in the tow being out of position and sliding too deep into the bend before the terminal to recover and successfully complete the turn.

Figure 45. Damaged conveyor as seen from the bank looking toward the river. SOURCE: BUDWINE AND ASSOCIATES INC.

Figure 46. Damaged conveyor and catwalk laying across the forward deck of barge *ART 44160*. The Farmers Grain Terminal can be seen in the background. SOURCE: BUDWINE AND ASSOCIATES INC.

ACCIDENT TYPE	VESSEL GROUPS
CONTACT	**TOWING/BARGE** **GOVERNMENT**

Barge Breakaway and Contact with the Emsworth Locks and Dams

LOCATION	
OHIO RIVER, MILE 6.2, EMSWORTH, PENNSYLVANIA	
ACCIDENT DATE **JANUARY 13, 2018**	REPORT NUMBER **MAB 19/11**
ACCIDENT ID **DCA18PM011**	ISSUED **MAY 17, 2019**

Figure 47. Emsworth Locks and Dams (not on accident date). Main channel locks and dam circled in yellow. Back channel dam circled in blue. The location is just west of Pittsburgh, Pennsylvania.
Source: Google Earth; annotated by NTSB

On January 13, 2018, at 0630 local time, 27 dry cargo barges broke free from the Jacks Run barge fleeting area at mile 4 on the right descending bank of the Ohio River near Pittsburgh, Pennsylvania. The barges drifted uncontrolled downriver and, beginning at 0712, struck the dams at the US Army Corps of Engineers Emsworth Locks and Dams complex, located at mile 6.2. Two Corps of Engineers workboats moored at the foot of the dam were also struck and driven into one of the dam's concrete piers, causing significant damage to both vessels. Nine barges and the Corps of Engineers workboats were declared constructive total losses in the accident. Total damage exceeded $12.5 million.

During November and December, cold temperatures caused ice to form in the Pittsburgh area river systems, but in early January, temperatures rose above freezing and some ice formations thawed, broke free, and floated downriver before freezing again during the night. On January 12, a record rainfall caused the water level in the Ohio River at the Emsworth Dams to rise more than 12 feet by 0615 on January 13. The river current increased accordingly, to 5-8 mph, as did the amount of ice flowing down the river.

Four miles downriver of Pittsburgh, Jacks Run fleeting area contained both empty and loaded hopper barges (filled with coal or cement aggregate). The barges were moored by lines to steel rings attached to steel-pile mooring cells. In anticipation of the high-water conditions and ice buildup on the river, the company managing (operating) Jacks Run deployed two towing vessels to tend the barges, but crews were challenged to adjust mooring lines to accommodate the rapidly rising water. Ice formations accumulated at the head of the barge fleet and at 0615, with the towboats made up to the barges, a captain saw sparks near an upriver cell and the entire flotilla began moving downriver. The captains were concerned for their vessel's safety and released the barges, notifying other towing vessels and the Emsworth Locks and Dams of the breakaway. Twenty-five of the 27 barges reached the dam complex, where some struck moored vessels, 7 passed through the open lift gates, 2 sank and the rest lodged in various locations.

Figure 48. Aerial photo of Emsworth Locks and Dam with breakaway barges. Source: Coast Guard

In addition to the rising water and increasing current, floating ice building up at the head of the barge flotilla significantly strained the barge moorings at Jacks Run. After the accident, the mooring ring on a forward cell was found missing, a ring on another cell was misshapen and broken mooring lines and cables remained attached to the cells. The breakaway occurred when the force of the river current acting on the extensive ice buildup at the front of the barge flotilla exceeded the capacity of the fleeting area's mooring cell fittings and the barge mooring wires.

Figure 49. Left to right: Hopper barges after striking the main channel dam. Stern of barge *C508* after colliding with Corps of Engineers workboats *Emsworth* (foreground) and *Dashields* (background). SOURCE: COAST GUARD

In high water conditions, the fleeting area operator had guidance to narrow the width of barge flotillas and remove gaps between barges. At Jacks Run, shoaling prevented the tending towboat crews from narrowing the flotilla, ice stopped them from removing gaps and two mooring cells were unusable. Therefore, poor maintenance and shoaling prevented the towing vessel crews from establishing a suitable mooring arrangement for the barge fleet. The investigation found that neither the fleeting area owner, nor the operator was adequately maintaining the facility and its moorings.

Fleeting area operators are expected to provide a waterfront facility operations guide, but neither the Corps of Engineers nor the Coast Guard could enforce the policies contained in them because the Pittsburgh area was not a regulated navigation area. Had the Pittsburgh area had a regulated navigation area with condition-based mooring requirements similar to the Mississippi River and Gulf Intracoastal Waterway regulated navigation areas, it is likely that the poor condition of the Jacks Run mooring cells would have been discovered and addressed. The NTSB recommended that the Coast Guard develop a regulated navigation area for the Pittsburgh region, that the Corps of Engineers require fleeting area permittees to submit waterfront facility operations guides and ensure the guides address the maintenance of fleeting areas and procedures for operating in high-water and ice conditions, and that the Coast Guard and Corps of Engineers collaborate to develop a policy to ensure fleeting areas are maintained in compliance with permit requirements.

The probable cause of the barge breakaway at the Jacks Run fleeting area and the barges' contact with the Emsworth Locks and Dams was the failure of the fleeting area owner, Allegheny County Sanitary Authority, and the operator, Industry Terminal and Salvage Company, to maintain the area's mooring cells and prevent shoaling, which resulted in inadequate mooring arrangements during high-water and ice conditions. Contributing to the accident was the Army Corps of Engineers' and Coast Guard's lack of resources and authority to effectively inspect fleeting areas and ensure that they are maintained.

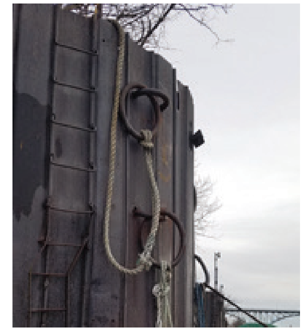


Figure 50. A piling at Jacks Run with mooring rings as designed.

Figure 51. Below, the forward piling at Jacks Run with a broken mooring ring anchor point and missing ring.

Figure 52. At left, a deformed anchor ring on third piling back from the forward piling at Jacks Run. At right, parted and frayed mooring wires from the lead shore-side barge during the accident.

ACCIDENT TYPE	VESSEL GROUP
CONTACT	**PASSENGER**

Contact of Cruise Ship ***Carnival Horizon*** with Manhattan Cruise Terminal Pier 90

LOCATION	
MANHATTAN CRUISE TERMINAL, PIER 90, NEW YORK CITY, NEW YORK	
ACCIDENT DATE **AUGUST 28, 2018**	REPORT NUMBER **MAB 19/29**
ACCIDENT ID **DCA18FM036**	ISSUED **OCTOBER 22, 2019**

Figure 53. *Carnival Horizon*'s bow after the accident. The forward mooring platforms where the lookout was stationed (about a 100 feet aft from the tip of the bow) are circled in yellow. Source: Coast Guard

Figure 54. *Carnival Horizon* at the Manhattan Cruise Terminal after the accident. Source: Coast Guard

On the morning of August 28, 2018, the cruise ship *Carnival Horizon*, with a total of 6,361 people on board, was maneuvering to berth no. 2 at Manhattan Cruise Terminal's Pier 88 in New York City, New York, when its bow struck the southwest corner of adjacent Pier 90. No one was injured and no pollution occurred, but Pier 90's walkway, roof parking garage, and facilities suffered extensive structural damage, and the ship sustained minor damage above the waterline, totaling about $2.5 million in cumulative damage.

The *Carnival Horizon* arrived at the entrance to New York harbor at 0318 on August 28. Due to the anticipated ebb current at the berth, the master hired the assist tractor tugboat *JRT Moran*, with a docking pilot from Metro Pilots on board, to berth the vessel. At 0530, the pilot boarded the *Carnival Horizon* just west of Chelsea Pier 61. He and the master conducted a master/pilot exchange. At 0537, the Metro pilot assumed the conn, supported by the ship's bridge team. The vessel's third officer was stationed at the forward mooring platforms and relayed via handheld UHF radio the distances from the ship's bow to the southwest corner of Pier 90. The staff captain repeated the distances to the bridge team.

At 0539, the master transferred control from hand steering to the starboard bridge wing control console. Two minutes later, the pilot ordered the *JRT Moran* captain to position the tugboat on the starboard bow. He provided maneuvering commands to both the *Carnival Horizon* master and the *JRT Moran* captain. Between 0545 and 0548, the ship's bow began to clear the corner of Pier 88 where the ship was to dock starboard side to. The pilot gave a series of thruster orders.

About 0548, the master asked if they should "start bringing the stern in," to which the pilot replied, "easy yes." The third officer relayed that the distance to the southwest corner of Pier 90 was 50 meters. The pilot requested the *JRT Moran* push "ahead easy" and requested the bow thruster "full to port" as the third officer forward reported he was going to the port mooring platform to monitor the distance to Pier 90. The bridge team members acknowledged the third officer's estimated distances but did not crosscheck his estimates with the increasing headway of the ship.

At 0549, the third officer reported the distance to Pier 90 as "one five" meters. About 15 seconds later, the third officer reported they were "getting really close," to which the pilot immediately responded to "back; go back." At 0549, the ship's bow struck the second and third levels of Pier 90's facility and parking garage. The pilot immediately ordered the azipods stopped, the bow thrusters full to port, and the *JRT Moran* to push full ahead from the starboard bow. With the pilot continuing at the conn, the docking maneuver was completed without further incident.

Carnival's navigation policy required a process called "thinking aloud," which allows for greater situational awareness of the bridge team. There was little audible evidence that the thinking-aloud concept was in practice during this accident sequence. Additionally, although Carnival's navigation policy and task assignments required monitoring of the person conning the vessel, crosschecking of the ship's position, and predicting track and headway, there was no evidence that any bridge team member alerted the master and pilot of the headway of the vessel toward the corner of Pier 90.

In addition, there was no evidence that the bridge team discussed any minimum safe distances with the pilot. Had there been established "minimum clearances to dangers" for the maneuver, the bridge team members may have had better awareness of the threshold for when they should alert each other or stop the maneuver, re-assess, and try again. Further, the third officer was designated to communicate distances and clearances, but from his standing position on either platform, his view of the contact point was completely obstructed by the ship's hull, so he had to estimate the distance from the tip of the bow to Pier 90.

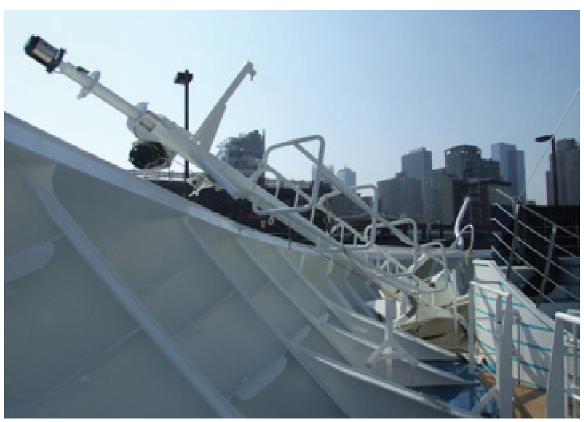


Figure 55. *Carnival Horizon*'s damaged forward mast and support structure.

Figure 56. Structural damage to Pier 90's parking garage.

As the ship continued to maneuver to the berth and rotated clockwise around the end of Pier 88, the bridge team and pilot progressively lost awareness of the vessel's headway toward the end of Pier 90. The closing distance went undetected or unchallenged by the bridge team until the ship was so close to the pier that no maneuver could have prevented the impact.

The New Jersey Maritime Pilot & Docking Pilot Commission conducted its own investigation and concluded that the Metro docking pilot failed to perform the appropriate pilot-to-pilot and master/pilot exchanges.

The probable cause of the *Carnival* Horizon's contact with Pier 90 was the ineffective interaction and communication between the master and the docking pilot who were maneuvering the vessel, and the bridge team's ineffective oversight of the docking maneuver. Contributing was the placement of the third officer in a location without view of the bow to monitor the close approach to Pier 90.

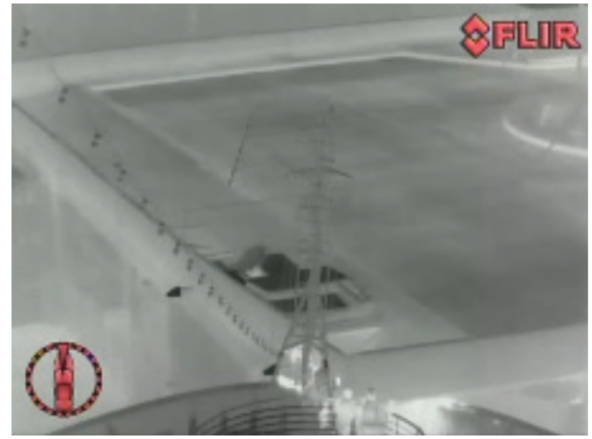


Figure 57. Screenshot from *Carnival Horizon*'s thermal night vision bow camera at the time of impact with Pier 90.

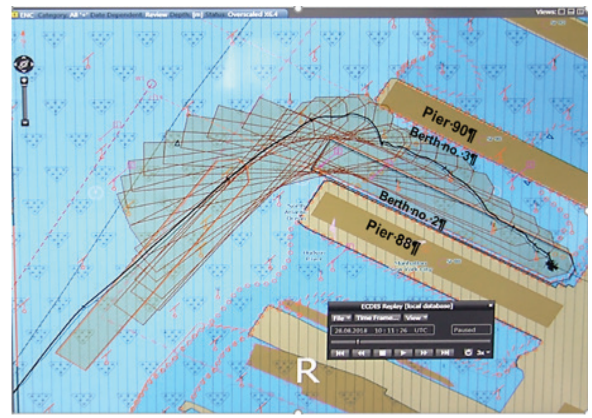


Figure 58. Screenshot from the *Carnival Horizon*'s ECDIS, showing the vessel's track beginning at 0539 and ending at 0611.

ACCIDENT TYPE	VESSEL GROUP
CONTACT	**TOWING/BARGE**

Anchor Contact of Articulated Tug and Barge ***Clyde S VanEnkevort/ Erie Trader*** with Underwater Cables and Pipelines

LOCATION	
STRAITS OF MACKINAC, MICHIGAN, ABOUT 2 MILES WEST OF MACKINAC BRIDGE	
ACCIDENT DATE **APRIL 1, 2018**	REPORT NUMBER **MAB 19/12**
ACCIDENT ID **DCA18FM019**	ISSUED **MAY 21, 2019**

Figure 59. ATB *Clyde S VanEnkevort/Erie Trader.*
Source: P. Markham

At 1732 local time on April 1, 2018, the ATB *Clyde S VanEnkevort/Erie Trader* was westbound with a crew of 14 in the Straits of Mackinac, Michigan, when the barge's starboard anchor, which had unknowingly released and was dragging on the bottom, struck and damaged three underwater electrical transmission cables and two oil pipelines. About 800 gallons of dielectric mineral oil leaked into the water from the cables; the oil pipelines sustained only superficial damage. Repair and replacement of the cables was estimated at more than $100 million. No injuries were reported.

During the 2017–2018 winter season, the *Clyde S VanEnkevort/Erie Trader* was laid up in Superior, Wisconsin. The ATB underwent maintenance and repairs, including a top brake band liner replacement on the barge's starboard anchor windlass brake, which had been out of service since October 2017. The port engineer informed the captain that the anchor had been repaired and tested.

On March 30, the ATB began its second voyage of the season, from Duluth to Indiana Harbor, Indiana. During the voyage, the ABs, who were responsible for clearing and securing the anchors, believed the starboard anchor was still out of service awaiting repair. The anchors were first ordered cleared on March 31, when the vessel passed Gros Cap Reef for the transit through the Soo Locks and St. Marys River. However, the AB on watch at that time stated he did not clear the starboard anchor because he had an understanding with the other AB to not clear it.

Figure 60. The bow of barge *Erie Trader* after the accident. At right: the remnant shank of the starboard anchor in the anchor pocket is highlighted. Source: Coast Guard

After passing the Soo locks, the vessel moored for the night (the anchors were not handled) and got underway the morning of April 1. At 1358, the ATB passed De Tour Reef Light, entered the open waters of Lake Huron and was ordered to full speed. The mate radioed the AB to secure the anchors, which was routine practice, and received an answer back that all was secure. The AB later stated that he secured only the port anchor, because the port anchor was the only anchor that he cleared the previous evening at Gros Cap Reef. Thinking the other AB would not have cleared the starboard anchor, he did not physically check it, assuming it was already secured. It could not be determined when the starboard anchor was last cleared.

The ATB continued toward Mackinac Bridge and through the Straits of Mackinac at a speed of about 11 mph. About 2320 the night of April 2, the ATB was approaching the entrance to Indiana Harbor, when an AB headed to the barge's bow to clear the anchors found the starboard anchor chain in the water trailing aft against the hull. He also found the starboard anchor cleared (meaning the devil's claw was not on the chain, hoisted up by a pulley away from the chain), the pawl off, and the chain paid out. The wildcat was also not engaged. When the anchor was heaved in, its flukes were missing, but the shank remained. None of the ATB crewmembers knew when the anchor paid out. Other than about a 1-knot speed reduction noticed by the captain, a change in handling characteristics was not noticed. Throughout the voyage, the ATB operated in ice, wind, and waves that created noise and movement. An AB stated that it was not customary to check anchor-handling spaces when underway. Had procedures been in place to regularly monitor these spaces, the unsecured anchor may have been detected earlier.

The Straits of Mackinac had underwater pipelines and transmission cables running in a general north and south direction. On April 3, the Coast Guard was notified of damage to the underwater transmission cables and the contact with the pipelines. The *Erie Trader*'s starboard anchor was the likely source of the damage. The anchor damaged three of the six electrical cables, one could be repaired while two required complete replacement. The anchor also struck the west leg of Enbridge's Line 5 dual pipeline, which transported crude oil from Canada to the United States, causing one minor dent in one pipeline and two minor dents in the other.

The anchor likely paid out slowly until it reached the water, at which point the additional force and the increasing weight of hanging chain likely hastened the payout as the brake was overwhelmed. Although anchor windlass brakes are not intended to hold an anchor and chain indefinitely during the dynamic conditions that vessels typically encounter on voyages, a properly adjusted brake should have had ample holding capacity for the weight of the *Erie Trader*'s anchor and chain. However, during the postaccident teardown and replacement of the *Erie Trader*'s starboard anchor windlass brake-band liners, the brake band had to be adjusted to ensure proper contact between the liner and drum with the brake activated. Based on the friction contact pattern on the upper liner, it is likely that the chief engineer and crew who replaced the top liner over the previous winter did not properly adjust the brake band. The brake band liner and hardware were replaced without the training, supervision, or instructions to properly carry out the task and ensure appropriate adjustments. Aside from the improperly adjusted band, investigators found no other defects in the anchor assembly.

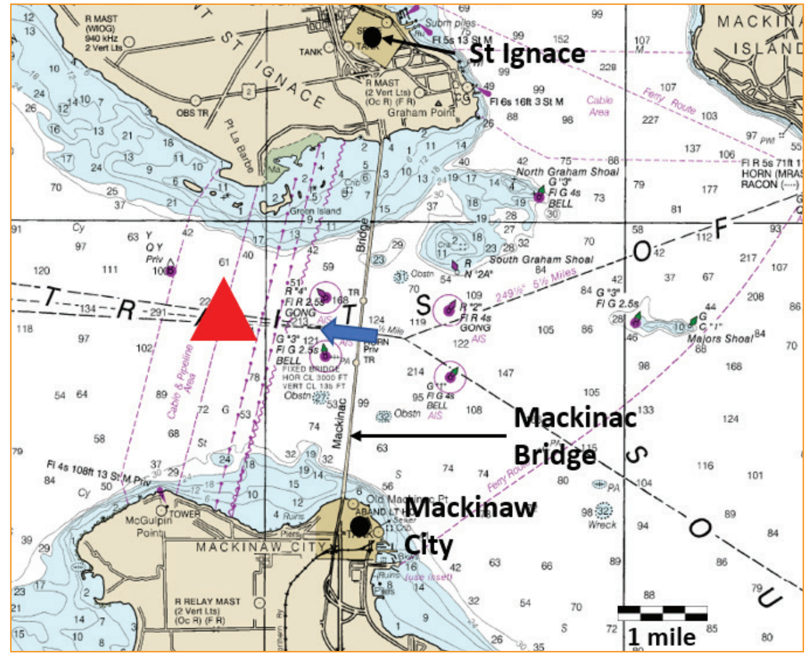


Figure 61. Section of NOAA chart 14881 showing a portion of the Straits of Mackinac. The location of contact with the underwater cables and pipelines is indicated by a red triangle. The blue arrow indicates the ATB's direction of travel. The soundings are indicated in feet.

The probable cause of the anchor contact of articulated tug and barge *Clyde S VanEnkevort/ Erie Trader* with underwater electricity transmission cables and oil pipelines was the failure of the anchor detail to secure the barge's starboard anchor, and the improper adjustment of the anchor brake band after the engineering crew replaced the brake liner, the combination of which allowed the anchor and chain to pay out under way.

ACCIDENT TYPE	VESSEL GROUP
CONTACT	**PASSENGER**

Contact of Cruise Ship *Nippon Maru* with Mooring Dolphins

LOCATION **APRA HARBOR, GUAM**	
ACCIDENT DATE **DECEMBER 30, 2018**	REPORT NUMBER **MAB 19/30**
ACCIDENT ID **DCA19FM012**	ISSUED **OCTOBER 23, 2019**

At 2113 local time on December 30, 2018, the stern of the cruise ship *Nippon Maru* struck mooring dolphins at the US Navy fueling wharf D in Apra Harbor, Guam, while the vessel was maneuvering in a turning basin after getting under way from the harbor's commercial port. No pollution or injuries were reported. Damage to the vessel was estimated at $456,080; damage to the mooring dolphins was in excess of $500,000.

Before getting under way, the *Nippon Maru* had been berthed bow-in at the commercial port. About 2050, a pilot boarded the *Nippon Maru* in preparation for an outbound transit of the harbor. The pilot's maneuvering plan for the ship was to come off the wharf and back down to where the harbor opened to a wider turning basin. The master would then use the *Nippon Maru*'s bow thruster and the pilot would use a tugboat made up to the stern to pivot the vessel around to port before heading outbound. Other than a brief discussion about the direction of the pivot, no other information was shared between the pilot and the master.

At 2104, the vessel got under way and began backing out of the berth. Once the vessel was in the turning basing, the pilot ordered the tugboat to begin pulling on the stern, perpendicular to the starboard side, and directed the master to thrust the bow to port to turn the vessel around. The pilot stated that his intention was for the ship to pivot until it was lined up in the center of the channel for exiting the port.

Figure 62. Starboard side of the stern of the *Nippon Maru* shows the damage to the ship. SOURCE: COAST GUARD

Figure 63. The *Nippon Maru* dockside after the accident. SOURCE: COAST GUARD

The master said that when the ship had turned 60 degrees, he intended to move the joystick that controlled the ship's main engines and rudders to starboard to assist with the turn. However, he told investigators that he mistakenly moved the joystick aft, providing astern propulsion. The pilot stated that shortly thereafter, he noticed that the ship was still going astern and requested that the master put the engines at dead slow ahead and the rudders hard to port. At 2112:03, the *Nippon Maru*'s sternway increased to 3 knots.

As the ship continued astern, the second officer on the stern made several reports to the master about the closing distance to the Navy mooring dolphins. At the same time, the captain of the tugboat made similar reports to the pilot over VHF radio. Concerned about the *Nippon Maru*'s position, the pilot ordered successively more power from the tugboat to increase the ship's rate of turn. He also requested that the master increase the *Nippon Maru*'s engine speed to half ahead.

At 2112:59, the third officer told the master that the joystick was now full astern. At 2113:17, the third officer again warned the master that the joystick was at full astern. Six seconds after that, the third officer yelled, "Ahead! Ahead!" The master did not respond and, at 2113:29, the stern of the *Nippon Maru* struck two of the D wharf's mooring dolphins.

The pilot stated that, as he prepared to leave the ship after the accident, he smelled alcohol on the breath of the master. He said that prior to this time he had not been close enough to the master to detect the odor. About 5 hours after the accident, the master had a positive alcohol screen based on a breathalyzer test. A retrograde extrapolation of the master's BAC at the time of the breathalyzer test indicates that he likely had a BAC of 0.14 g/dL at the time of the accident. This level exceeded the Coast Guard maximum allowable BAC of 0.04 g/dL. Moreover, a BAC between 0.06 and 0.15 g/dL is associated with memory, attention, coordination, and balance impairments, with impairments increasing with BAC.

Because the breathalyzer test was conducted 5 hours after the *Nippon Maru* struck the D wharf, it is possible that the master's BAC was the result of additional alcohol consumed after the accident. However, the master's errors in maneuvering the vessel were not consistent with his level of skill and experience and suggest that he was impaired during the vessel's voyage.

According to the pilot, a master/pilot exchange was not conducted on the *Nippon Maru* prior to getting under way. A master/pilot exchange would have allowed the pilot and master to talk through the expected actions of the master and the operation of the joystick controller. Furthermore, interaction with the master during a master/pilot exchange would have given the pilot an opportunity to discover that the master had been drinking, and, if he believed it necessary, an alternate arrangement could have been made to ensure that the *Nippon Maru* was operated safely.

The National Transportation Safety Board determined that the probable cause of the passenger vessel *Nippon Maru*'s contact with the mooring dolphins at the US Navy wharf D in Apra Harbor, Guam, was alcohol impairment of the master while he conned the vessel, resulting in an errant astern engine input.

ACCIDENT TYPE	VESSEL GROUP
CONTACT	**CARGO**

Contact of Bulk Carrier *Shandong Fu En* with Ergon-St. James Terminal Wharf

LOCATION	
LOWER MISSISSIPPI RIVER NEAR MILE 161, CONVENT, LOUISIANA	
ACCIDENT DATE	REPORT NUMBER
APRIL 6, 2018	**MAB 19/14**
ACCIDENT ID	ISSUED
DCA18FM020	**JUNE 12, 2019**

Figure 65. Initial impact of the *Shandong Fu En* bow swinging into the Ergon-St. James Terminal wharf at 0637:08. At right: Screenshot of the *Shandong Fu En* 20 seconds earlier. A crack and three other holes were found in the bulk carrier's shell plate below the waterline. SOURCE: ERGON-ST. JAMES TERMINAL

About 0637 on April 6, 2018, while turning around to head downriver with the assistance of three tugboats, the bow of the bulk carrier *Shandong Fu En* struck Dock 1 of the Ergon-St. James Terminal wharf at mile 160.7 on the Lower Mississippi River during high-water conditions. The *Shandong Fu En*, loaded with coal, had just departed the Convent Marine Terminal wharf, located across the river at mile 160.9. No pollution or injuries were reported, but the vessel and the wharf sustained $6.25 million in damage.

Figure 64. Damaged walkway at the Ergon-St. James Terminal about 4 hours after the accident.
SOURCE: COAST GUARD

On April 4, 2018, at 1735, the vessel moored at the Convent Marine Terminal wharf with its bow upriver and three towboats along the vessel's port side in case the force of the current, moving at about 4.7 knots, threatened the vessel's moorings. The river was at high-water stage. At midnight on April 5, a pilot with the New Orleans and Baton Rouge Association came on board the vessel to guide the ship to an anchorage in Reserve, Louisiana, 24 miles downriver at mile 137. The pilot's only sleep in the previous 36 hours took place the previous day, between 1400 and 1800. Within the confines of the riverbanks and in the vicinity of the wharf, the pilot planned to swing the vessel's bow to the left/port, across the southbound current and come to a course of 178 degrees for the voyage downriver.

At 0610, the pilot gave orders to begin moving the vessel. Three tugboats were assigned to assist the bulker with turning in the river. The pilot provided direction and engine orders to the tugboats and rudder and engine orders to the *Shandong Fu En* crew. With the last lines let go at 0628, the pilot gave orders to move the bulker forward and 150 feet away from the wharf to mitigate the risk of colliding with a derrick barge moored astern of the ***Shandong Fu En***. Once away from the wharf, he planned to make sternway so that the bulker's pivot point would be one-third of its length from the stern. This way, the river current acting on the vessel's starboard side would swing the bow counterclockwise.

At 0629:17, the bulker's heading slowly started moving to port at a rate of turn of less than 5 degrees per minute. About 5 minutes later at 0634:08, the rate of turn momentarily reached as high as 37 degrees per minute. At 0634:56, the pilot ordered dead slow astern, and the vessel's rate of turn slowed to 22 degrees per minute. At 0635:17, the pilot ordered slow astern; then half astern; and then full astern. At 0636:26, the captain of one of the tugboats radioed, "you're pretty close right here." The pilot responded, "I am backing all I got." Less than 15 seconds later, the bow of the ***Shandong Fu En*** struck the Ergon-St. James Terminal wharf.

The ***Shandong Fu En*** continued swinging until the vessel was turned around. The pilot then navigated the vessel 13 miles downriver, anchoring the bulk carrier at 0850. Surveyors examined the vessel and found the forepeak flooded from four penetrations of the shell plate below the waterline.

Three assist tugboats were the usual number necessary in high-water conditions to safely move a vessel off the dock and turn it around. However, after the bulker came off the dock, the river current quickly began to move the vessel toward the right descending bank and downriver. The towboats could have been positioned differently, and the full-astern engine orders could have been executed earlier to keep the bulker from drifting. The pilot had completed this maneuver dozens of times previously and was familiar with the challenges of the river being at high-water stage and running at more than 5 mph.

Figure 66. *Shandong Fu En* before the accident.
SOURCE: VINCENT MARITIME

Even for experienced pilots, fatigue can affect performance in various ways, such as increased reaction times, reduced alertness, and difficulty processing information. It can, therefore, degrade a person's ability to stay alert and attentive to the demands of safely controlling a vessel. The pilot's limited sleep and the fact that he was nearing the end of an 8-hour shift increased the likelihood that fatigue affected his judgment while directing three tugboats and maneuvering the *Shandong Fu En* in challenging high-water conditions.

The probable cause of the contact of bulk carrier *Shandong Fu En* with the Ergon-St. James Terminal wharf was the fatigued pilot's misjudgment of a downstream turning maneuver during high-water conditions.

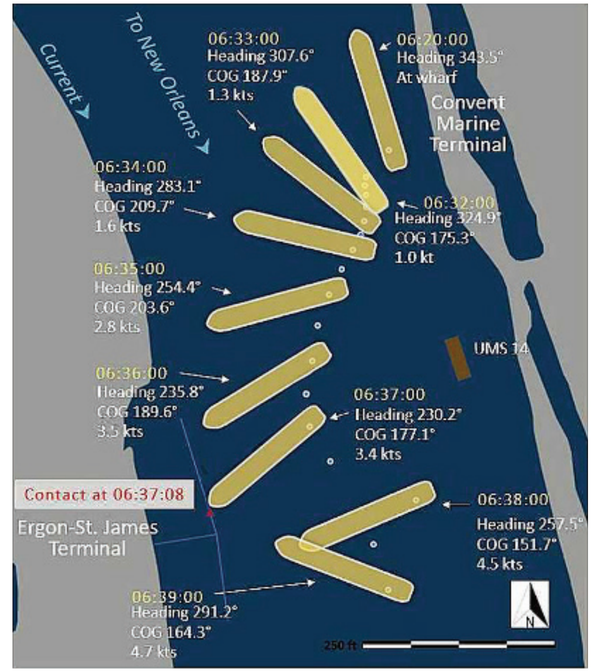


Figure 67. Trackline of the *Shandong Fu En* from 0620 to 0639, showing the vessel's heading and COG.
BACKGROUND SOURCE: GOOGLE MAPS

MITIGATING RISK OF FATIGUE DURING HIGH-WATER CONDITIONS
Pilot organizations have recognized that even for experienced pilots, fatigue can degrade performance especially in challenging conditions aboard deep-draft vessels. Since the accident, the New Orleans and Baton Rouge Association Board of Examiners instituted new procedures to mitigate the risk associated with operating deep draft vessels in high water conditions on the Mississippi River. These procedures include increasing the sleep opportunity for pilots by 1) lengthening the time between turns from 8 to 12 hours, and 2) reducing the work hours for attended moored vessels from 8 to a maximum of 6 hours per shift. They also include limiting pilot transits and mooring operations to daylight hours.

ACCIDENT TYPE	VESSEL GROUP
CONTACT	**TOWING/BARGE**

Contact of Towing Vessel ***Steve Richoux*** with Mardi Gras World Pier

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 98, NEW ORLEANS, LOUISIANA	
ACCIDENT DATE	REPORT NUMBER
MAY 7, 2018	**MAB 19/15**
ACCIDENT ID	ISSUED
DCA18FM022	**JUNE 19, 2019**

Figure 69. *Steve Richoux* and barges after the accident (view downriver with the Crescent City Connection Bridges in the background). SOURCE: MARDI GRAS WORLD

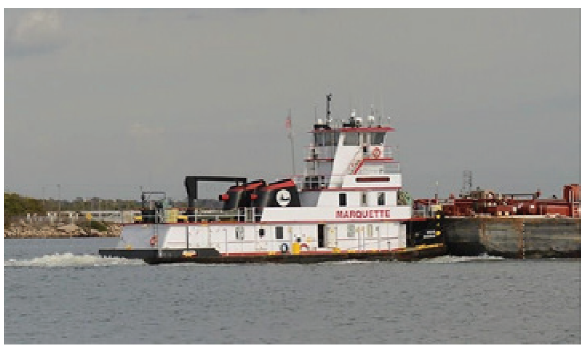


Figure 68. *Steve Richoux* under way before the accident. SOURCE: COAST GUARD

On May 7, 2018, about 1848 local time, the towing vessel ***Steve Richoux,*** with five crewmembers, was downbound on the Mississippi River in New Orleans, Louisiana, pushing six loaded cement barges when a steering system failure occurred. The pilot and the captain tried to regain steering control of the vessel. Despite their efforts, the ***Steve Richoux*** struck the Mardi Gras World pier at mile 98. No pollution or injuries were reported; estimated property damage exceeded $3 million.

At 1300, the vessel departed with the pilot at the helm to move to a staging area south of the Huey P. Long Bridge. Shortly after the tow entered Gouldsboro Bend at 1841, the pilot moved the controls on the flanking rudders "hard to port" to prevent the vessel from going too far toward the left descending bank. As he did that, he began having difficulty maintaining his intended heading, so he moved the main rudders to starboard to turn the tow toward the right descending bank. However, with no helm control, the ***Steve Richoux*** continued to cross the river and head toward the left descending bank. The pilot and the captain tried to regain steering by repositioning the flanking and main rudder handles and by reapplying the flanking rudders hard to port and the main rudders hard to starboard. They also changed over from the no. 2 to the no. 1 steering pump, but both sets of rudders remained unresponsive. As the pilot and the captain placed the flanking rudders hard to port, an alarm—labeled as "SHIP SERV"—activated. The captain noted and silenced the alarm.

At 1847, the pilot radioed that he was losing control of the vessel. As the tow continued to approach the left descending bank of the river, the pilot placed both engines full astern, sounded the general alarm to warn the crew, and blew the vessel's whistle to warn the people on the wharf and inside Mardi Gras World warehouse. Before any assistance could arrive, the lead two barges of the tow struck the wharf, causing significant damage to both the wharf and the warehouse. Two forward barges sustained minor damage.

After the tow entered Gouldsboro Bend, a steering failure of the flanking rudders occurred after the pilot moved the sticks hard to port. The cause was later determined to be over-travel of the port flanking rudder hydraulic ram piston, which overpressurized the system. Not realizing the cause of the steering failure, both the pilot and the captain cycled the steering levers for the flanking rudders hard to port several times in an effort to counteract the effect of the current as it moved the vessel toward the river's left descending bank. Neither the captain nor the pilot realized that the activated "SHIP SERV" alarm meant that the steering system was overpressurized. Had the alarm been labeled as such, they would have known that the system had a problem.

The pilot and the captain tried switching the steering gear pumps to regain control of the vessel but doing so had no effect because the steering loss was caused not by the failure of a steering gear pump but by over-pressurization of the hydraulic system. Steering could not have been restored until the system pressure returned to normal. In an effort to control the vessel, the pilot's rudder commands included placing the flanking rudders hard-to-port, which, unbeknownst to the pilot and captain, was the source for the continued overpressurized condition and subsequent continued lifting of the relief valve, which prevented normal system operating pressure from being restored. Had the captain or the pilot understood the cause of the steering failure, they would only have had to move the flanking rudders off the hard-to-port position to regain steering.

The operational testing of the steering gear system following the 2017 drydock period would not have discovered the over-travel by the port flanking rudder's hydraulic ram, because the testing did not place the rams in the hard-to-port position long enough to overpressurize the hydraulic system. In addition, the maintenance program and reporting system for the vessel was not effective because the crewmembers who had direct experience with the flanking rudder steering issue prior to the accident did not report related alarms to the company's maintenance personnel for repair.

The probable cause of the contact of the *Steve Richoux* tow with the Mardi Gras World pier was a loss of steering control due to a recurring yet unreported problem with the vessel's steering system.

Figure 71. Damage to the Mardi Gras World warehouse and wharf. SOURCE: COAST GUARD

LABELING OF ALARMS

Accurate labeling of alarms pertaining to critical machinery and essential systems is crucial so that vessel operators understand the nature of problems or failures. Quickly understanding what specific condition exists allows crewmembers and/or the operating company to take timely and appropriate action to mitigate or correct the condition.

Figure 70. From left to right: (1) The port flanking rudder steering hydraulic ram that was removed after the incident. (2) The port flanking rudder steering system with the original steering ram in place. (3) Alarm panel located on the starboard side of the wheelhouse near the deck. The alarm labeled "SHIP SERV" indicated that the steering system was overpressurized.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**TOWING/BARGE**

Explosion and Fire aboard Articulated Tug and Barge ***Buster Bouchard/ B. No. 255***

LOCATION	
ARANSAS PASS FAIRWAY ANCHORAGE, 3.5 MILES OFF PORT ARANSAS, TEXAS	
ACCIDENT DATE	REPORT NUMBER
OCTOBER 20, 2017	**MAB 19/07**
ACCIDENT ID	ISSUED
DCA18FM002	**APRIL 18, 2019**

Figure 72. *B. No. 255* bow on fire following an explosion.
Source: Coast Guard

Figure 73. *ATB Buster Bouchard/B. No. 255.* Source: Bouchard Transportation Co., Inc

On October 20, 2017, at 0430 local time, the crews of the ATB *Buster Bouchard*/*B. No. 255* were preparing to get under way from anchorage to proceed into the Port of Corpus Christi, Texas, when an explosion and subsequent fire occurred on the bow of the barge. Two barge crewmembers who were on the bow were killed in the explosion. The fire was extinguished about 1100 on the same day. Approximately 2,000 barrels (84,000 gallons) of crude oil were released from the barge into the water or were consumed in the fire. The barge sustained over $5 million in damage and was scrapped after the accident. There was no damage to the tugboat.

On October 19, 2017, the *Buster Bouchard/B. No. 255* anchored in the Aransas Pass Fairway Anchorage offshore from Port Aransas, Texas. The barge was carrying crude oil distributed in all 16 tanks, with the no. 1 port cargo tank about 90 percent full. About 0430 the next morning, the mate on watch in the *Buster Bouchard* wheelhouse and the two barge crewmembers were preparing to raise the anchor on the barge. A crewmember retrieved the anchor windlass controller from the forepeak area, then began hauling in the anchor.

Initially, the recovery of the anchor proceeded normally. The barge captain reported to the mate on the *Buster Bouchard* that two shots of chain remained in the water, and that the anchor was off the bottom. He then reported that the anchor winch was under heavy strain. After the last communication from the barge, the mate saw a flash out of his peripheral vision. As he looked forward, he saw blue flames on the bow around the area of the winch, immediately followed by an explosion. The mate sounded the tugboat's general alarm and attempted to call the barge crew on the handheld radio. He received no answer, and he could no longer see the two crewmembers on the bow. The mate then sent a distress call via VHF radio, reporting the incident to the Coast Guard.

A second and third explosion followed, and a fire erupted. The crew disengaged the tugboat from the damaged barge. The Coast Guard coordinated search efforts for the missing crewmembers, while fire boats worked to extinguish the fire. The fire was extinguished about 1100. A unified command coordinated efforts to stop the cargo leak and clean up discharged oil. The *B. No. 255* was salvaged and towed to port 5 days after the explosion.

The majority of the damage to the *B. No. 255* was found in the forepeak of the barge, and photographs showed the fire in the same location, indicating the initial explosion originated in the forepeak. During postaccident examination of the bulkhead separating the no. 1 port tank from the forepeak, through-cracks were found in the area of the original bulkhead that had not been previously repaired; the steel around the cracks was pock-marked and pitted. Examination of the through-cracks indicated that this corrosion was present before the accident explosion, thereby compromising the integrity of the cargo containment in the no. 1 port tank.

The no. 1 port cargo tank was 90 percent filled, placing the level of crude oil above the cracks. The oil seeped through the openings in the bulkhead and collected inside the forepeak, increasing the crude oil vapor content. While raising the anchor, the wiring in the forepeak was energized and could have been a source of ignition. In addition, an exposed electrical wire on an energized circuit on the cargo deck could have created an electrical arc capable of igniting fuel vapor.

Bouchard Transportation had fully implemented an SMS; however, inspection and survey records indicated that the overall condition of the barge was historically poor and never improved. Postaccident inspections of other Bouchard Transportation barges resulted in 251 deficiencies and operational controls placed on 10 barges, indicating that the SMS and maintenance processes failed to ensure proper maintenance of the company's fleet of barges.

Coast Guard inspection records prior to the accident indicated that the vessel was compliant with regulations and fit for service. The Coast Guard marine inspectors who examined the barge failed to identify unsafe conditions, allowing the vessel to continue to operate at increased risk. Additionally, an ABS survey of the barge in 2016 noted significant discrepancies with the barge, but it does not appear that these discrepancies raised concern about the overall maintenance and safety of the vessel. The ABS's survey program was ineffective in ensuring the safety of barge *B. No. 255* and its crew.

The probable cause of the explosion aboard the barge *B. No. 255* was the lack of effective maintenance and safety management of the barge by Bouchard Transportation, which resulted in crude oil cargo leaking through a corroded bulkhead into the forepeak void space, forming vapor, and igniting. Contributing to the accident were the ineffective inspections and surveys by the Coast Guard and the American Bureau of Shipping.

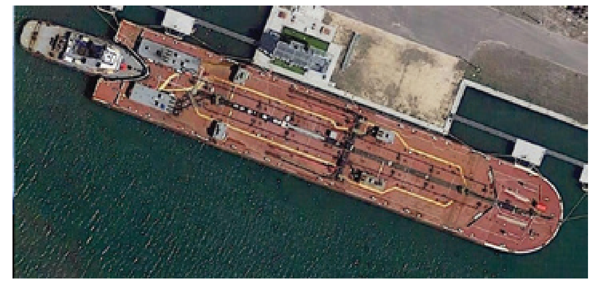


Figure 76. Overhead view of an ATB configuration. SOURCE: BOUCHARD TRANSPORTATION CO., INC.

Figure 74. Explosion and fire damage to port bow of *B. No. 255*. SOURCE: COAST GUARD

Figure 75. Cracks in bulkhead separating the forepeak from the port no. 1 cargo tank. The dashed section was removed and sent to the NTSB Materials Laboratory for analysis. SOURCE: COAST GUARD

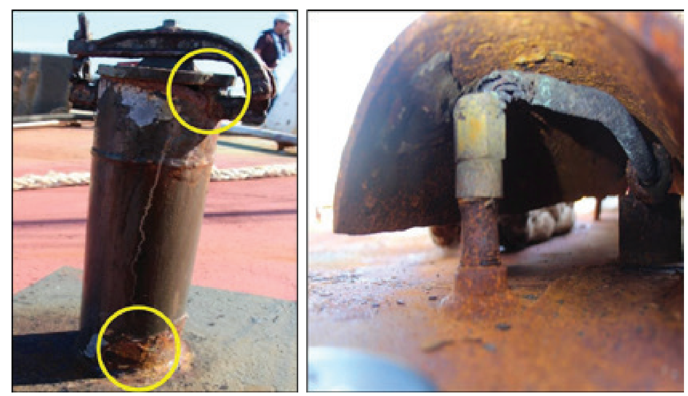


Figure 77. Postaccident photos of corroded no. 1 starboard cargo tank ullage tube (left) and wasted armored protected electrical cable with exposed wiring (right). SOURCE: COAST GUARD

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Engine Room Fire aboard Fishing Vessel *Cape Cod*

LOCATION	
PAGO PAGO HARBOR, AMERICAN SAMOA	
ACCIDENT DATE **MAY 20, 2018**	REPORT NUMBER **MAB 19/06**
ACCIDENT ID **DCA18FM024**	ISSUED **APRIL 10, 2019**

Figure 78. *Cape Cod* in port. SOURCE: TRI MARINE FISHING MANAGEMENT

On May 20, 2018, at 1536 local time, the fishing vessel ***Cape Cod*** experienced an engine room fire while moored in Pago Pago Harbor on Tutuila Island, American Samoa. The vessel was in port to offload a cargo of fish at the Samoa Tuna Packing dock with 20 crewmembers on board. The fire caused extensive damage to the engine room, including generators and electrical distribution systems, before crewmembers extinguished it using the fixed firefighting system. No pollution or injuries were reported. Damage to the vessel was estimated at $650,000.

The ***Cape Cod***, a purse seiner fishing vessel, returned from its latest fishing trip on the morning of May 20, 2018. The crew moored the vessel at the Samoa Tuna Packing dock on the north side of Pago Pago Harbor to provision and offload the fish. All crewmembers were on board, and a single generator, no. 1, was online while awaiting cargo operations.

At 1536, while the assistant engineer and the electrician were in the lower engine room, a fire started above the offline no. 2 generator. They tried unsuccessfully to extinguish the fire with handheld extinguishers but were forced to retreat due to smoke. They alerted the other crewmembers.

Having donned SCBAs, the crew made another attempt to extinguish the fire but were again forced to retreat, this time due to intense heat. After closing the doors and ventilation dampers and accounting for everyone on board, the crew released CO_2 into the space using the ***Cape Cod***'s fixed fire-extinguishing system. As part of the CO_2 release sequence, generator no. 1 tripped offline, and the vessel lost power.

The fire was contained to the engine room. About an hour after the fixed fire-extinguishing system was activated, municipal first responders and ***Cape Cod*** crew in SCBAs entered the space to confirm that the fire was out. No injuries were reported, and no pollution ensued. Both generator nos. 1 and 2 were removed for repair and most of the electrical cables, lighting, and other equipment had to be replaced.

Although ducting blocked the origin of the fire in the CCTV footage, the glow of the fire seen in the video revealed a quick and intense ignition with little smoke, suggesting an electrical ignition source forward of generator no. 2. Also, the engine room appeared clean and free of loose combustibles. The crew's initial response with portable extinguishers was ineffective, given that the electrical power near the fire had not yet been shut down.

Based on the location of the damage in the engine room, the intensity of the fire observed in the CCTV footage, and the lack of operating machinery near generator no. 2, investigators concluded that the fire likely resulted from an electrical source and was fueled by electrical cable housing material, control boxes, light fixtures, and paint. The vessel had recently undergone extensive work in the engine room, although with no subsequent regulatory or classification society drydock exam or sea trial.

The fixed fire-extinguishing system aboard the *Cape Cod* functioned as designed, and the crew demonstrated competency in activating the system and promptly sounding the alarm. The crew's early and correct use of the fixed system, including shutting down the ventilation, successfully contained the fire to a corner of the engine room and limited the damage to the vessel.

The probable cause of the engine room fire aboard fishing vessel *Cape Cod* was an undetermined electrical ignition source near electrical distribution cabling in the lower engine room.

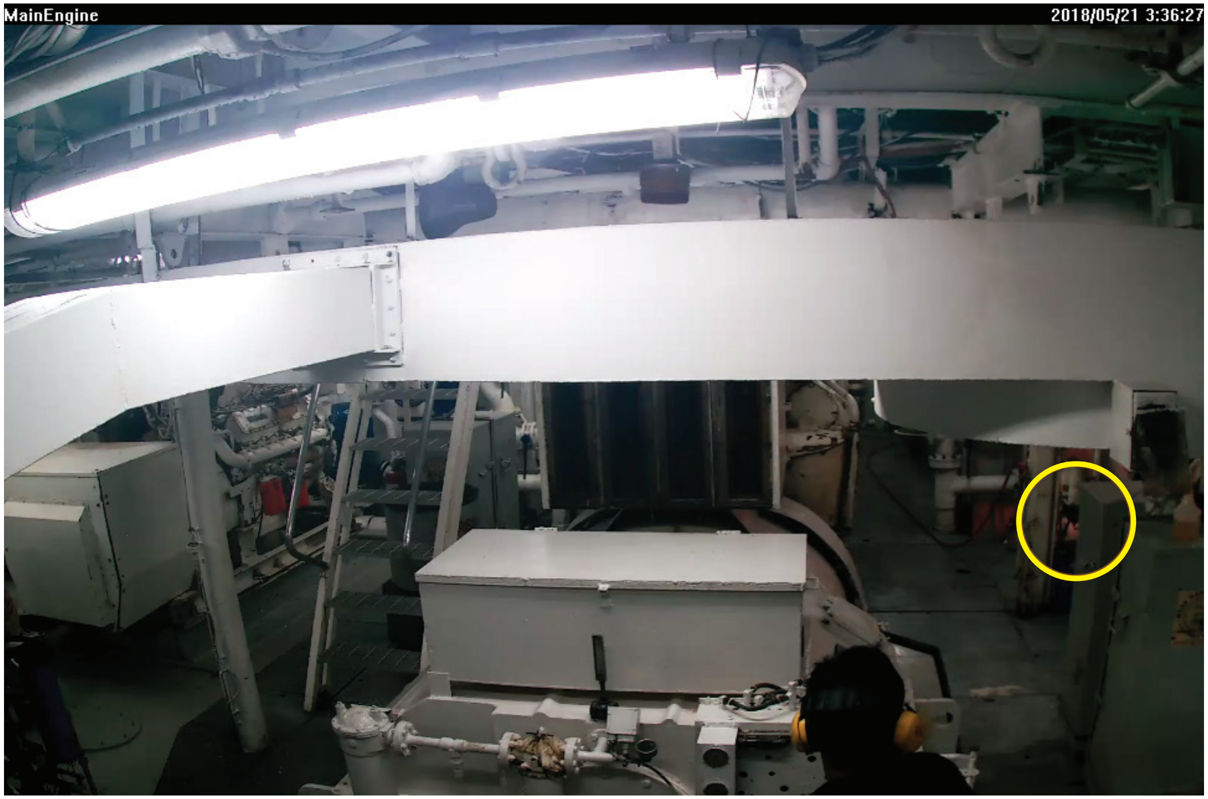


Figure 79. Screenshot from the closed-circuit television camera in the lower engine room, looking forward. The initial fire began in the area overlaid by a yellow circle (starboard side). Source: Coast Guard

Figure 80. Left: Electrical cabling above generator no. 2. Right: Smoke and heat damage in the overhead of the starboard forward corner of the lower engine room. Source: Coast Guard

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**CARGO**

Fire aboard Cargo Ship ***Chipolbrok Moon***

LOCATION	
INDUSTRIAL TERMINAL WEST, GREENS BAYOU, PORT OF HOUSTON, TEXAS	
ACCIDENT DATE	REPORT NUMBER
MAY 23, 2018	**MAB 19/09**
ACCIDENT ID	ISSUED
DCA18FM025	**APRIL 24, 2019**

Figure 82. *Chipolbrok Moon* in port.

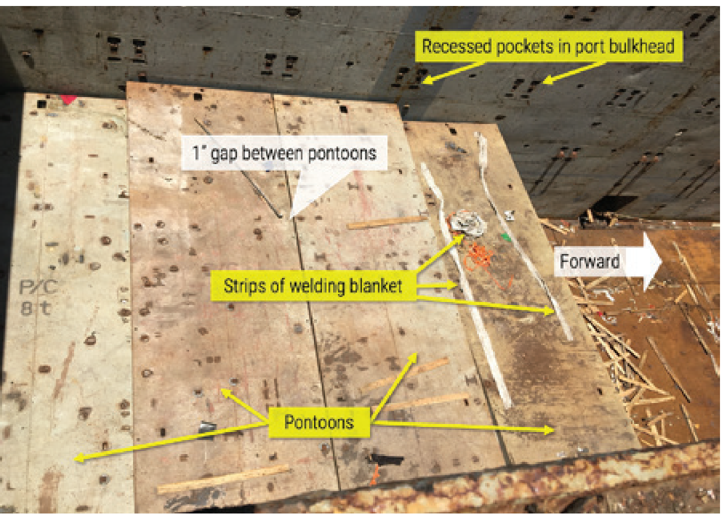


Figure 81. *Chipolbrok Moon* pontoon decks in cargo hold. A gap between the pontoons is labeled.

On May 23, 2018, at 0010 local time, a fire was detected in a cargo hold on board the cargo ship *Chipolbrok Moon* while moored at the Industrial Terminal West in Greens Bayou in the Port of Houston, Texas. Some of the vessel's 24 crewmembers had completed hot work in that space about 25 minutes before the alarm sounded. The crew manually activated the fixed CO_2 fire-extinguishing system in the affected space, and the fire was extinguished. Several wind-turbine components being carried as cargo were damaged in the fire. No pollution or injuries were reported. Damage to the vessel was estimated at $12 million.

About 1950 on May 22, after the crew received a certificate from a marine chemist deeming the cargo holds "safe for hot work" and completed a hot work permit, the ship's fitter began cutting away the welded steel sea fastener tabs in cargo hold no. 3 port on the pontoon upper tween deck using an oxygen/acetylene torch. An oiler and a deck officer were assigned as fire watches, and a dry powder fire extinguisher and garden hose were on hand. The crew placed narrow strips that had been cut from larger fiberglass welding blankets over the gaps in the pontoons but not under the cargo skids due to the low clearance to the decks. The crewmembers used flashlights to see in the cargo hold.

The fitter and the fire watch removed the steel tabs on the upper tween deck level, moved to the lower hold and cut away the tabs from the deck that had been installed to secure the cargo, then proceeded to the lower tween deck and cut the tabs off from that deck. They waited for about 25 minutes in the port cargo hold after completing hot work and then proceeded to the starboard cargo hold, where the oiler smelled smoke. About the same time, the fire alarm sounded throughout the ship, and the smoke detection system panel indicated an alarm in cargo hold no. 3. The crew closed the access manholes, and the third mate released CO_2 from the vessel's fixed fire-extinguishing system into cargo hold no. 3. The crew monitored the bulkhead temperatures in cargo hold no. 3 for the next 8 hours. The captain called and emailed the company offices in Houston and China but did not make any other notifications to the port or the Coast Guard, nor did he make any radio broadcasts during or after the fire, even though the vessel's response plan required doing so.

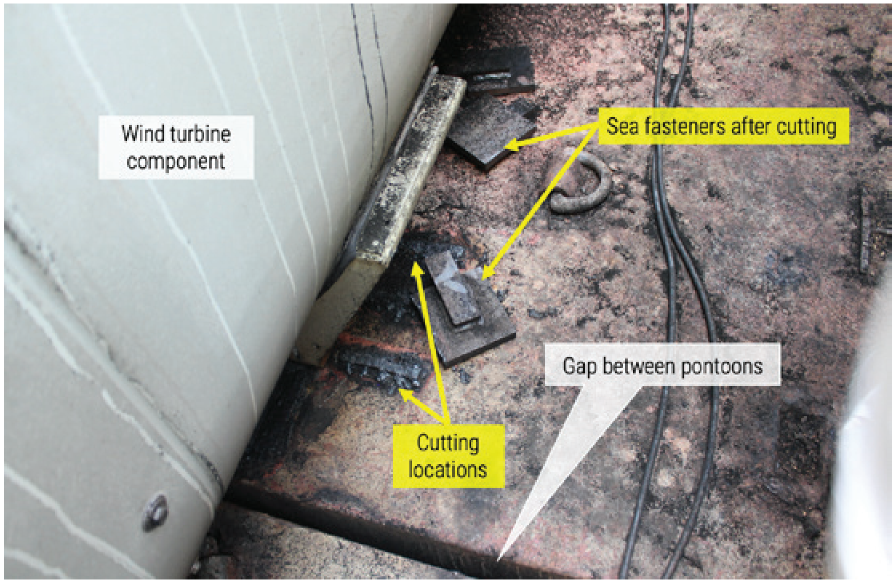


Figure 83. Left: Steel sea fasteners cut from deck in the portside no. 3 hold aboard *Chipolbrok Moon*, identified with yellow arrows. The gap between pontoons is also identified. SOURCE: HARRIS COUNTY FIRE MARSHAL

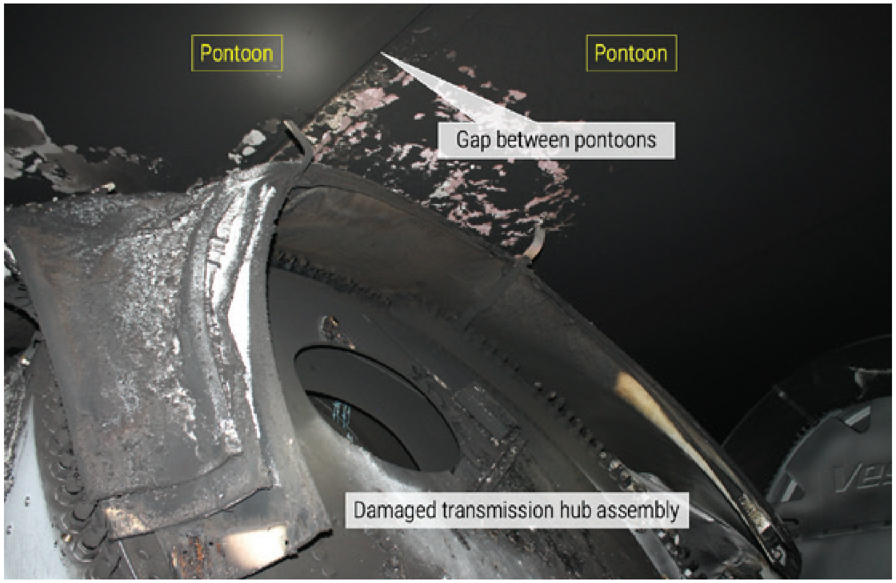


Figure 84. Fire damage to transmission hub in cargo hold no. 3 aboard *Chipolbrok Moon* directly below gap between pontoons. SOURCE: HOUSTON FIRE MARSHAL

The cargo of transmission hubs was located on the lower deck just below the pontoons making up the lower tween deck level. The crew was conducting hot work near a gap between two pontoons on the deck above, and, according to a postaccident inspection, sparks/welding slag were able to fall from the work location through the unprotected gaps between the pontoons, igniting the turbine component's dust-protective transport plastic and blanket. In addition, transmission hubs stored aboard the vessel were wrapped in a material (polyethylene terephthalate) that ignited relatively easily. The crew of the *Chipolbrok Moon* did not ensure adequate placement of fire blankets, particularly in areas that were difficult to access. Further, the modification of the fire blankets into narrow strips could have easily led to shifting, uncovering the gaps between the pontoons. In his permit, the marine chemist noted that hot work areas needed to be at least 35 feet away from flammable and combustible materials. However, because of the loading configuration, the hubs were located less than a foot below the hot work area on the lower tween deck in port cargo hold no. 3. Additional fire blankets should have been placed over the hubs.

Additionally, the required permit and notification to the Port of Houston Port Authority was not completed, and during the fire, the captain did not notify the port or the Coast Guard. This lack of notification did not meet the vessel's response plan. The shortcomings of the crew in following all components of the hot work procedures demonstrated a lack of understanding of hot work SMS procedures.

The probable cause of the fire aboard cargo vessel *Chipolbrok Moon* was the crew's lack of adherence to the company's safety management system and the marine chemist's instructions pertaining to hot work precautions, which allowed sparks and slag to fall through unprotected gaps between the removable decking pontoons and ignite the dust-protective covering of the transmission hubs.

FIRE PROTECTION AND PORT NOTIFICATION
Before conducting hot work, it is critical to evaluate work areas for fire hazards to ensure that adequate protection is in place. In addition, notifying shoreside authorities both before conducting hot work and in the event of a fire allows port authorities to properly prepare and respond more rapidly.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**OFFSHORE SUPPLY**

Fire aboard Offshore Supply Vessel *Grand Sun*

LOCATION	
CHANDELEUR SOUND, LOUISIANA	
ACCIDENT DATE **OCTOBER 8, 2018**	REPORT NUMBER **MAB 19/36**
ACCIDENT ID **DCA19FM001**	ISSUED **NOVEMBER 25, 2019**

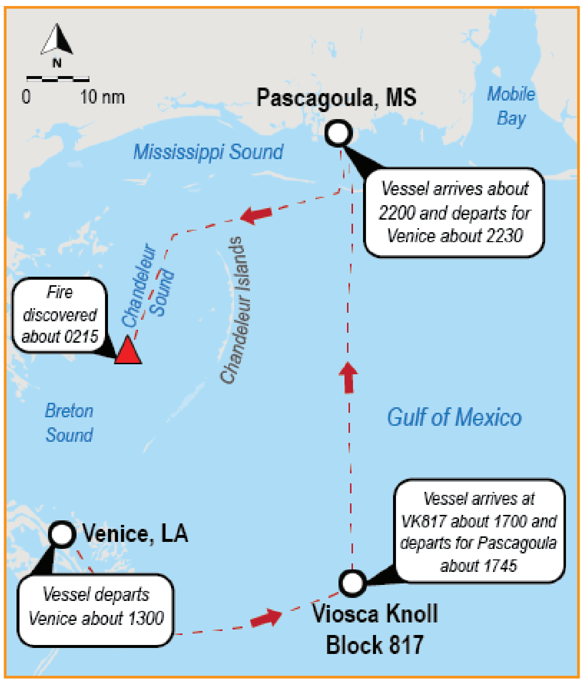


Figure 85. The *Grand Sun* was en route back to Venice, Louisiana, when the accident occurred.
Background source: Google Maps

Figure 86. The *Grand Sun* post-fire. Source: Coast Guard

On October 8, 2018, about 0215 local time, the offshore supply vessel ***Grand Sun*** was transiting the Chandeleur Sound in the Gulf of Mexico, about 15 miles from the Chandeleur Islands, Louisiana, when the vessel caught on fire. The four crewmembers aboard attempted to fight the fire but were unsuccessful. They remained on the stern of the vessel until they were rescued by the Coast Guard. The fire burned itself out, and the vessel was later towed to port. No pollution or injuries were reported. The vessel, valued at $1.6 million, was deemed a constructive total loss.

On October 7, the day before the accident, the ***Grand Sun*** departed Venice, Louisiana, at 1300 en route to Viosca Knoll Block 817 (VK 817), an oil platform about 58 miles offshore, with two captains and two deckhands. The vessel arrived at 1700, loaded 34 passengers and cargo, departed the platform at 1745, and arrived in Pascagoula, Mississippi, at 2200. After discharging the passengers and offloading cargo, the vessel departed at 2230, en route to Venice, Louisiana.

The second captain was in the wheelhouse operating the vessel at 16 knots, and the on-duty deckhand served as lookout and made security rounds. The off-duty first captain and deckhand both fell asleep in the galley about 0100. About 0200, the on-watch deckhand noticed an odd smell and made rounds of the vessel; he returned to the wheelhouse and told the second captain that he was unable to find the source.

About 0215, on his fourth round searching for the source of the odor, the on-watch deckhand discovered a pile of work vests on fire atop a chest freezer behind the door leading to the wheelhouse from the upper passenger compartment. He woke the first captain and off-duty deckhand. The crew started the fire pump and headed to the compartment, where they found thick smoke. The flames appeared small, so the first captain used a nearby freshwater "garden hose" to attempt to extinguish the flames. About the same time, the wheelhouse filled with thick smoke, forcing the second captain out of the wheelhouse before he could make a mayday call by VHF radio. When he opened the wheelhouse door, the fire expanded rapidly into the wheelhouse.

The second captain was attempting to contact 911 emergency services ashore on his cell phone from the bridge wing when flames developed on the aft bulkhead in the wheelhouse. The first captain opened the wheelhouse door and fought the fire with a fire hose, but water pressure was lost, along with the vessel's electrical power. With no water for the fire hoses and the heat too intense to retrieve the portable fire extinguishers, the crew ceased efforts to fight the fire and moved to the stern on the cargo deck.

Due to connectivity problems, it took several attempts to report the emergency to a 911 operator, who routed the call at 0235. By 0352, the fire had burned itself out, and later, a Coast Guard helicopter hoisted all four crewmembers from the vessel's stern. The owner dispatched the *Sun Fighter*, with a surveyor on board, to assess the damage and tow the vessel to shore.

The fire consumed the vessel's entire superstructure, including the interior main deck and wheelhouse, and the aluminum hull was nearly burned to the waterline amidships. Based on fire damage in the wheelhouse and the interior main deck, the likely origin of the fire was in the upper passenger compartment, due to the overheating of electrical wiring either in the chest freezer or in the bulkhead at the receptacle powering it.

The watch smelled an odor related to the fire and completed four rounds of the vessel over a 15-minute period to find its source; however, by the time the crew identified the location of the smell, the work vests were on fire. Although the crew attempted to extinguish the fire, they were hindered by heavy smoke and the combustible materials in the upper passenger compartment, including the wood paneling, window curtains, and passenger lifejackets stowed overhead, which allowed the fire to rapidly expand.

The probable cause of the fire on the *Grand Sun* was the overheating of electrical wiring associated with a chest freezer or the receptacle powering it, which was located in an accommodation space. Contributing to the extent of the fire damage was the substantial use of combustible wood paneling and drapery throughout the accommodation spaces.

Figure 87. The *Grand Sun* before the accident.
SOURCE: Y & S MARINE INC

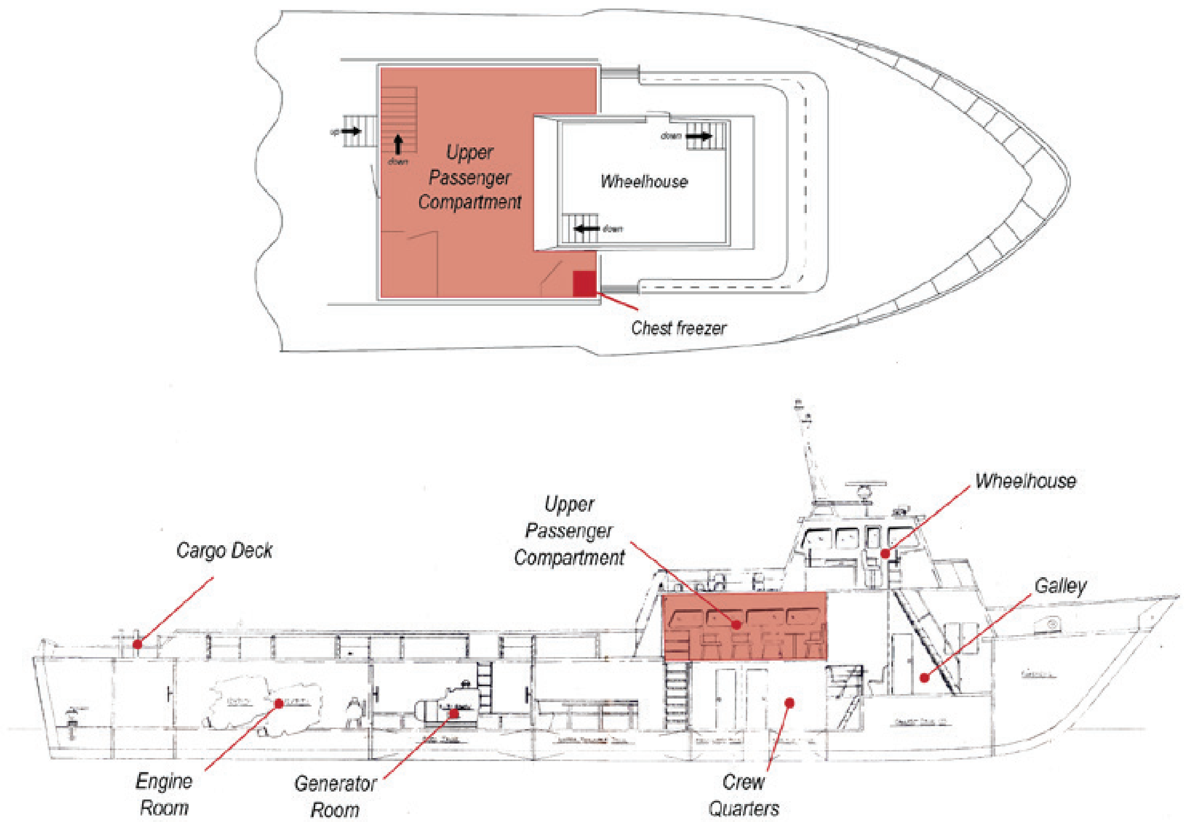


Figure 88. Vessel plans modified to show the wheelhouse, upper passenger compartment, galley, and crew quarters. The passenger compartment where the fire was discovered is highlighted in red, and the chest freezer is marked as a red square. SOURCE: Y&S MARINE INC , ANNOTATED BY NTSB

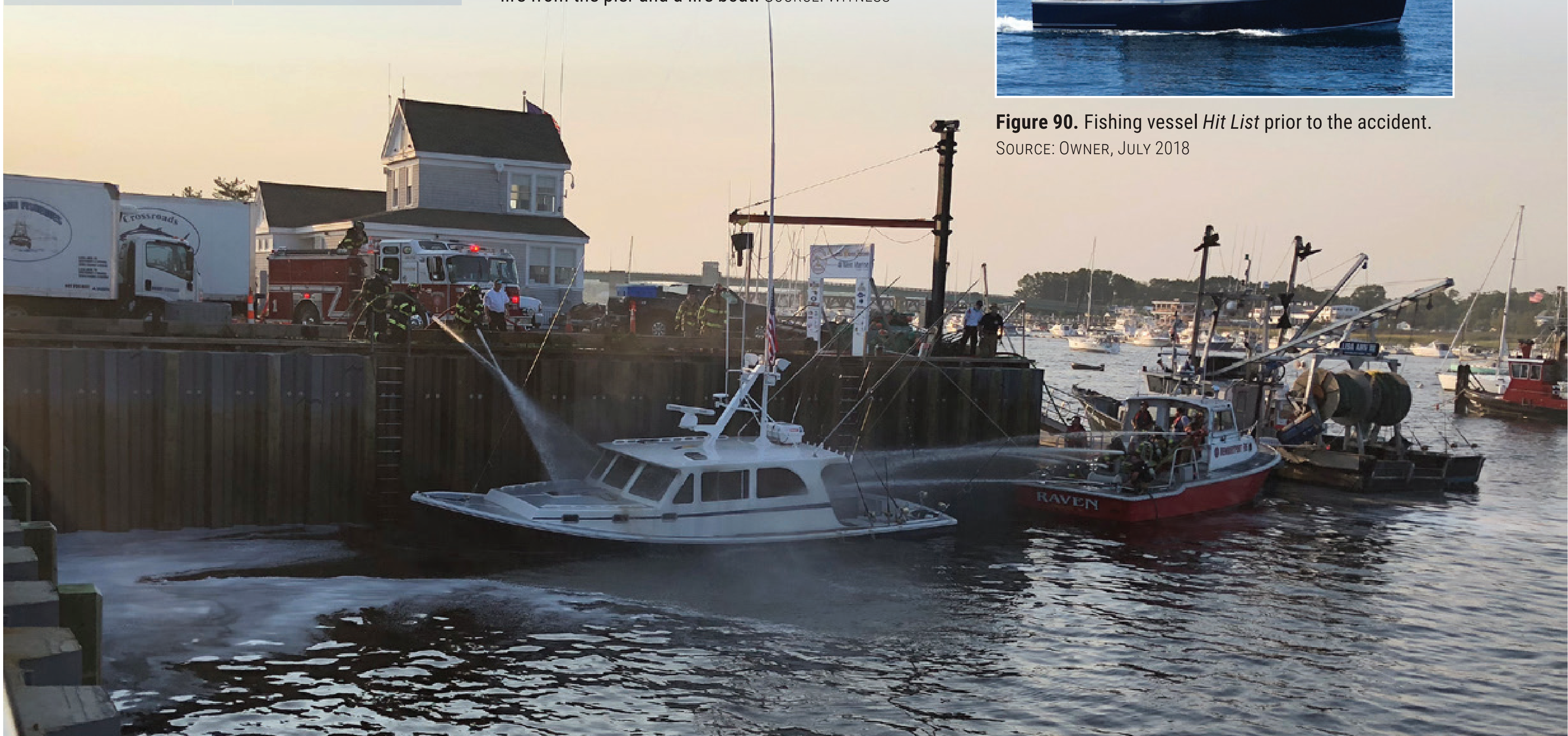
ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire and Subsequent Sinking of Commercial Fishing Vessel ***Hit List***

LOCATION	
MERRIMACK RIVER AT THE HARBORMASTER'S DOCK, NEWBURYPORT, MASSACHUSETTS	
ACCIDENT DATE **AUGUST 24, 2018**	REPORT NUMBER **MAB 19/16**
ACCIDENT ID **DCA18FM035**	ISSUED **JUNE 26, 2019**

About 1725 on August 24, a fire was detected in the engine compartment aboard the commercial fishing vessel ***Hit List*** shortly after the vessel arrived at the Newburyport harbormaster's dock to offload its catch. The crew on board attempted to fight the fire, but after smoke filled the cabin all four people aboard evacuated to the pier. The local fire department fought the fire using foam and water. The fire was extinguished about an hour later when the vessel partially sank alongside the pier. Approximately 100 gallons of diesel fuel leaked into the Merrimack River. No injuries were reported. Damage to the vessel was estimated at $550,000.

Figure 89. Below: Fire department fighting the *Hit List* fire from the pier and a fire boat. SOURCE: WITNESS



About 2200 on August 23, the ***Hit List***, with the two owners (father and son) and two friends on board, departed Gloucester, Massachusetts, and headed out to join the 6th annual Newburyport Shark and Tuna Fishing Tournament. They anchored at the southwest corner of Stellwagen Bank, approximately 6 miles off Cape Cod, Massachusetts. The next morning, they began fishing and caught an estimated 200-pound bluefin tuna at about 1030. About 1330, they got under way for the 40-mile trip to Newburyport to weigh the tuna for the tournament.

Figure 90. Fishing vessel *Hit List* prior to the accident.
SOURCE: OWNER, JULY 2018

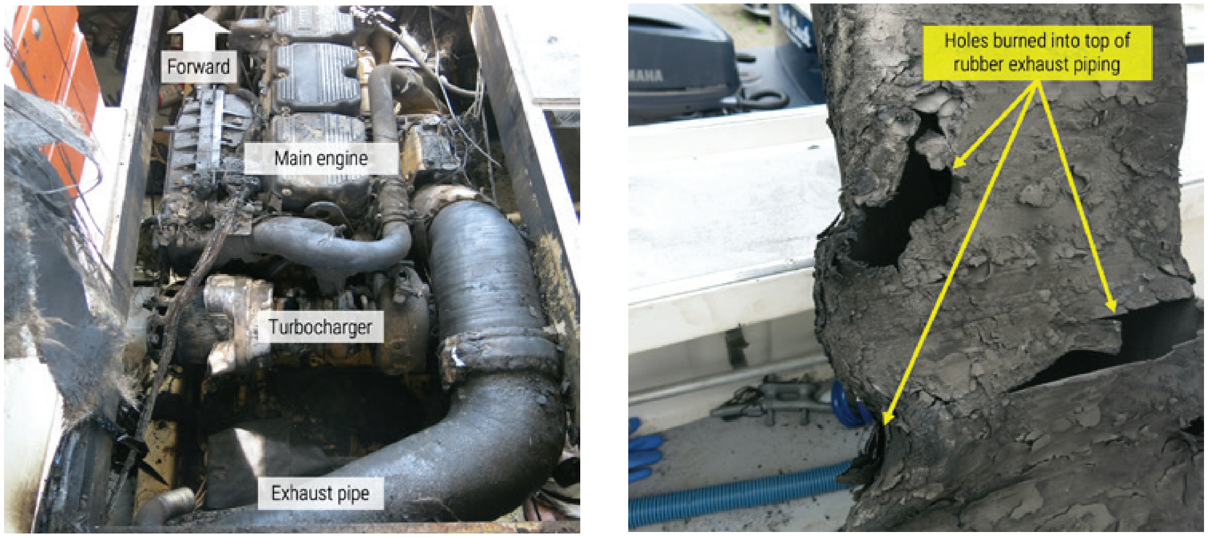


Figure 91. Damage to the engine as seen from above. Right: Damaged exhaust tubing after removal from engine room.

About 1725, as the *Hit List* was approaching the Newburyport harbormaster's dock, the owners were in the cabin, and the two friends were on deck to handle the mooring lines. As the vessel was being tied up alongside the pier, both owners in the cabin noticed a burning electrical smell and saw smoke on the monitor in the aft area of the engine compartment. The son placed his hand on the deck above the engine compartment and felt "a great deal of heat." He lifted the two smaller hatches in the cabin area located on each side of the engine compartment and saw smoke but no flames and could not tell exactly what was burning. The owners were unable to further investigate due to the increasing smoke, which began to fill the cabin.

Once docked, the owners discharged two portable dry chemical fire extinguishers into the engine compartment in an attempt to extinguish the fire. The Newburyport harbormaster provided a shoreside fire extinguisher to the vessel and assisted the crew with disembarking the vessel. At 1729, he called the Newburyport Fire Department and then contacted the Coast Guard and a salvage company.

Firefighters arrived on scene at 1735. Two firefighters equipped with a firehose boarded the *Hit List*. They accessed the engine compartment but were unable to locate the source of the fire. After being directed to evacuate, they used water and foam to combat the fire from the pier. The fire department's fireboat was dispatched and took up position behind the stern of the vessel, where its crew began applying water to the fire.

About 1830, firefighting water applied to the vessel, as well as river water flooding through holes later found in the port exhaust pipe, caused the vessel to partially sink, which extinguished the fire, leaving only the top of the cabin exposed. A salvage company arrived on scene later that evening to refloat the vessel and transport it to a local marina.

Investigators determined that the initiating event for the fire aboard the *Hit List* was a failure of a hydraulic hose fitting connected to a distribution block in the overhead of the aft part of the engine compartment for the pot hauler system. After the fire, the fitting was found to be broken off from the hydraulic block, and it most likely sprayed hydraulic fluid when pressurized onto the surface of the main engine turbocharger and ignited when the exterior surface heated up while the vessel was underway. The fire eventually spread to other areas of the engine compartment and filled the cabin with smoke.

It is unknown when the fire started. The pot hauler system was last used to haul in the anchor about 4 hours before the transit to Newburyport. If the hydraulic fitting had broken during this operation, then pressurized oil could have been sprayed onto the engine and remained there as the engine generated heat throughout the return transit.

The vessel sank because of water used in suppression efforts and holes burned through the wet-exhaust hose from the heat of the fire, which allowed seawater to flood the engine compartment from the exhaust outlet on the port side of the vessel.

The probable cause of the fire aboard fishing vessel *Hit List* was the failure of a hydraulic hose fitting that sprayed pressurized hydraulic oil onto the engine, eventually causing the oil to ignite. Contributing to the sinking was water applied during firefighting efforts and flooding through the rubber engine exhaust tubing, which the fire burned through.

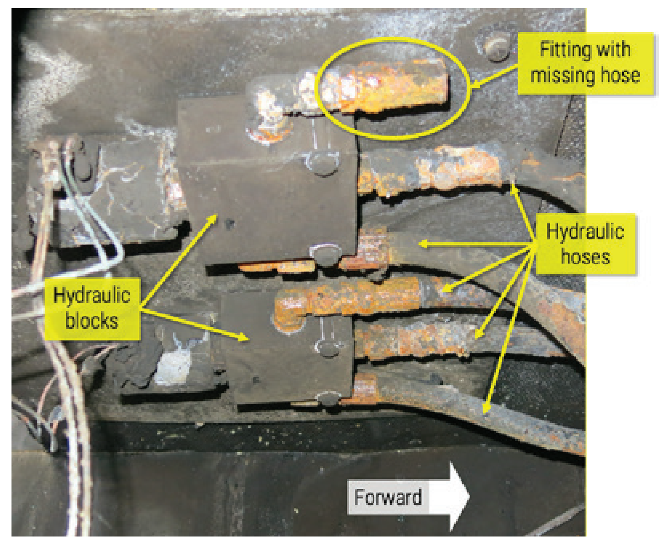


Figure 92. Hydraulic block with parted hose fitting, circled in yellow.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**TOWING/BARGE**

Engine Room Fire aboard Towing Vessel ***Jacob Kyle Rusthoven***

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 6738, NEAR WEST HELENA, ARKANSAS	
ACCIDENT DATE **SEPTEMBER 12, 2018**	REPORT NUMBER **MAB 19/28**
ACCIDENT ID **DCA18FM038**	ISSUED **OCTOBER 17, 2019**

Figure 93. *Jacob Kyle Rusthoven* (formerly the *Capt. George Brumley*) prior to the fire.
SOURCE: STEVE HENDERSON

Figure 94. Two towing vessels push the remaining barges of the tow as the *Jacob Kyle Rusthoven* burns. The center head barge, which had turned over, sits on top of the port head barge. SOURCE: COAST GUARD

About 1005 local time on September 12, 2018, a fire broke out in the engine room of the towing vessel *Jacob Kyle Rusthoven* while it was pushing nine barges southbound on the Lower Mississippi River at mile 673.8, approximately 6 miles north of West Helena, Arkansas. As the fire spread, three of the barges broke away from the tow, and one rolled over and lost its cargo. All six crewmembers abandoned the vessel onto the barges, from where they were rescued by a Good Samaritan vessel. Due to smoke inhalation, the crew was later sent to the hospital and discharged the same day. No pollution was reported. The *Jacob Kyle Rusthoven*, valued at an estimated $1.5 million, burned completely.

On September 8, the *Jacob Kyle Rusthoven* tow got under way, pushing nine barges in three strings of three, with a crew of six, including a captain and pilot, traveling southbound on the Mississippi River en route to Baptiste Collette Bayou, Louisiana. On September 12, about 0800, the vessel approached Mhoon Bend near mile 688. The captain attempted to flank the bend but lost control of the tow, and the head of the tow struck the bank. He maneuvered the tow off the bank and continued southbound.

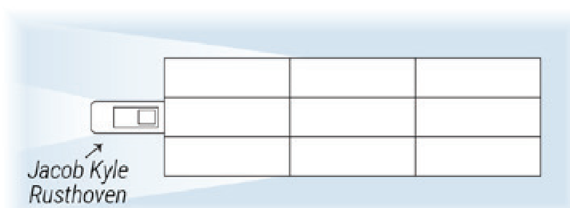


Figure 95. Simplified tow arrangement of the *Jacob Kyle Rusthoven* (not drawn to scale).

The captain of the *Bill Atkinson,* a towboat traveling northbound, radioed to agree to a passing arrangement, and, about 0919, pushed up on the west bank at mile 673.6. As the *Jacob Kyle Rusthoven* passed, the captain of the *Bill Atkinson* noticed smoke coming from the open starboard-side engine room door of the *Jacob Kyle Rusthoven*. The captain of the *Jacob Kyle Rusthoven* then broadcasted on the radio that his vessel was on fire and adrift.

The mate was awakened by the smell of smoke and the sound of the fire alarm. When he exited through an aft door to the open deck, he saw the two deckhands and deckaneer assembled at the vessel's port bow and asked them to help extinguish the fire. By the time the mate arrived on the main deck, "everything just shut down." The pilot was awakened by the sound of the fire alarm and the boat "backing real hard;" he proceeded to the wheelhouse. The vessel and tow were broadside to the current and drifting down the river.

The deckhand went to the open portside engine room door on the main deck and discharged a fire extinguisher inside. The mate went to retrieve the fire hose but discovered the electric fire pump, located in the engine room, was not working. Both the pilot and captain evacuated the wheelhouse, and the captain instructed the crew to abandon the burning vessel onto the barges. Skiffs from nearby Good Samaritan vessels picked up the crewmembers from the tow and brought them to the *Bill Atkinson*.

The stern of the *Jacob Kyle Rusthoven* hit the bank, and the tow wires started to part. The center head deck barge flipped over and lost its load of limestone. Three of the barges in the starboard string broke out of the tow. Towing vessels assisted in gathering the towboat and its barges. Firefighters extinguished the fire later in the evening, at 1913. The *Jacob Kyle Rusthoven* was towed to a shipyard for examination and disposal.

The fire was determined to have originated at or near the inboard turbocharger on the starboard-side main engine based on the heat damage at that location. A commercial forensics science firm found that a loose fitting on the lube oil supply line was a likely fuel source. Considering witness accounts of the captain operating the vessel at full power, it was likely that when smoke first appeared, the lube oil in the line to the turbocharger was at or near its maximum operating pressure. The pressurized lube oil could have atomized from the loosened fitting and consequently come into contact with a hot surface on the starboard engine near the turbocharger. The atomized oil would have likely ignited and eventually spread the fire to adjacent combustible materials in the engine compartment, before spreading upward.

Figure 96. Smoke emanating from the open starboard-side and aft engine room doors on the main deck.
Source: *Bill Atkinson* captain

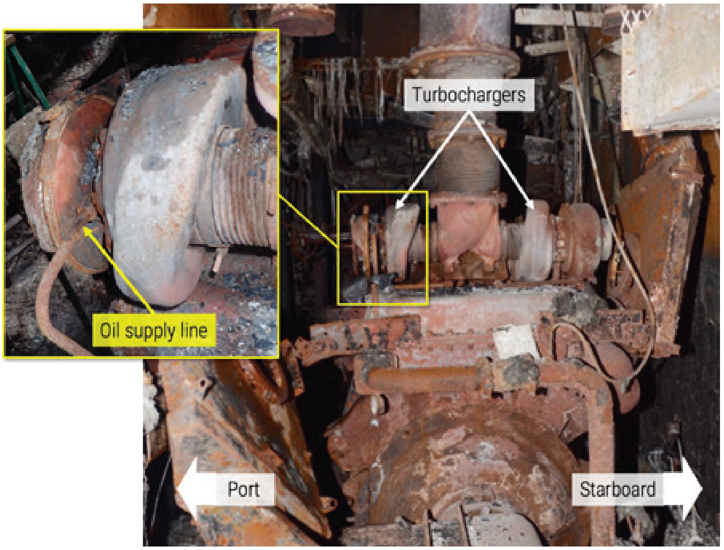


Figure 97. Fire-damaged starboard main engine, while looking forward. The yellow box highlights the inboard turbocharger with its casing and compressor missing due to the damage. The inset shows the lube oil supply line fitting that was found to be loose.
Source: SEA Limited, annotated by NTSB

The *Jacob Kyle Rusthoven* was not fitted with a fixed fire-extinguishing system in the engine room, nor was it required to have one. By the time the mate reached a fire hose, the vessel had lost electrical power, and the fire pump in the main engine room therefore was not operable. Because the captain did not instruct the crew to activate the emergency fuel shutoff valves, and no one closed the main deck doors to the engine room, the fire was able to spread rapidly.

The probable cause of the engine room fire on board the towing vessel *Jacob Kyle Rusthoven* was an engine lube oil leak that ignited off a hot surface near the starboard main engine turbocharger. Contributing to the severity of the fire was the lack of crew measures to activate the engine fuel supply shutoffs and secure open doors ventilating the engine room.

Figure 98. The abandoned *Jacob Kyle Rusthoven* on fire.
Source: Coast Guard

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire and Sinking of Fishing Vessel *Jeanette*

LOCATION	
PAGO PAGO HARBOR, AMERICAN SAMOA (FIRE), PACIFIC OCEAN (SINKING)	
ACCIDENT DATE **DECEMBER 5, 2018**	REPORT NUMBER **MAB 19/32**
ACCIDENT ID **DCA19FM010**	ISSUED **NOVEMBER 8, 2019**

Figure 99. The fishing vessel *Jeanette* prior to the fire.

Figure 100. The bridge of the *Jeanette* engulfed in fire. Source: Coast Guard

About 1130 local time on December 5, 2018, a fire started within the dry stores locker on board the fishing vessel ***Jeanette***, which was pier side at the American Samoa Government container facility in the port of Pago Pago, Tutuila Island, American Samoa, with 18 crewmembers and one shoreside vessel representative on board. The crew and the local shoreside fire department attempted to extinguish the fire, but with the fire worsening and the vessel's load of fuel, lube oil, and ammonia deemed a hazard to the port, the port authority ordered the vessel to be towed offshore. While under tow and still on fire, the vessel sank about 15 miles south of the island at 1039 on December 6. The estimated property damage exceeded $15 million.

On November 22, the vessel docked at the container facility to await its turn to offload its catch. The captain, chief engineer, and the mate departed the ***Jeanette*** and left Tutuila Island for 2–4 weeks. In their absence, the company's shoreside vessel representative was responsible for arranging the unloading of the catch and coordinating the replenishment of spare parts and stores.

On December 5, three crewmembers were assigned to remove wasted sections of the overhead frames on the wet deck and weld in new sections. The crewmember assigned as fire watch conducted a walkthrough of the main deck area located above the worksite but did not enter the dry stores locker, which contained flammable items, because it was locked. The cook had the only key.

At 0730, the two welders began conducting their hot work near the centerline of the vessel. The third crewmember served as the fire watch and assisted the welders. The fire watch periodically left the hot work area to check the main deck area directly affected by the heat of the welding. After a break from 0900–0930, the crewmembers continued working until about 1055, when they stopped for lunch. A smoke detector began to alarm in the area of the dry stores locker. The cook unlocked the door, and the crewmembers saw fire and used handheld dry chemical extinguishers to try to put it out. Initially, they were successful, but the smoke soon began to overwhelm them, so they retreated, leaving the door open, which allowed the fire to re-ignite and spread.

A crewmember notified emergency services of the fire about 1122. The first fire truck arrived on scene at 1136, but the firefighters were not equipped with SCBAs to enter the smoke-filled vessel. One of the vessel's crew donned an SCBA, but he was not wearing a firefighting suit and was unable to approach the growing fire. A second fire truck arrived at 1320, and the fire team made initial entry using their SCBAs and began firefighting efforts. The tugboat ***Iseula*** responded on scene and applied their water monitor to the starboard-side wheelhouse to suppress the flames.

As a result of firefighting efforts, the *Jeanette*'s wet deck began to flood, and the vessel began to list slightly to port. The vessel continued to burn, so at 1552, it was towed south into the Pacific Ocean. On December 6, at 1039, the vessel sank in open water about 15 miles offshore.

The crewmembers were welding adjacent to a space containing charcoal and paper goods, which presented a substantial fire risk. Because there was only one fire watch assigned to monitor both the wet deck and the main deck, the fire watch could not effectively monitor both decks. Also, the fire watch was assisting the welders when he should have been focused solely on preventing and detecting a fire. Further, the welding crew and fire watch left immediately for lunch instead of ensuring that the affected welding areas were safe and that there was no potential for a fire. The shortcomings of the crew demonstrate a lack of understanding of the risk that hot work posed to the vessel. If the vessel owner had provided the crew with a policy or formal training for conducting hot work, the crew likely would have been more aware of their responsibility to properly prepare and monitor the spaces adjacent to the location of hot work.

Contributing to the growth and spread of the fire was the ineffective response by the crew. The crew failed to follow the fire muster procedure and properly utilize critical fire equipment, allowing the fire to spread to the point where it could not be contained, and the vessel became a hazard to the port.

The probable cause of the fire and sinking of the fishing vessel *Jeanette* was inadequate crew training and oversight by the company to ensure safe hot work practices were followed on board the vessel. Contributing to the spread and growth of the fire was the lack of a clearly designated person in charge during the response, which resulted in an ineffective firefighting effort by the crew.

Figure 101. The fishing vessel *Jeanette* being towed by the tugboat *Iseula* while on fire.

SOURCE: COAST GUARD

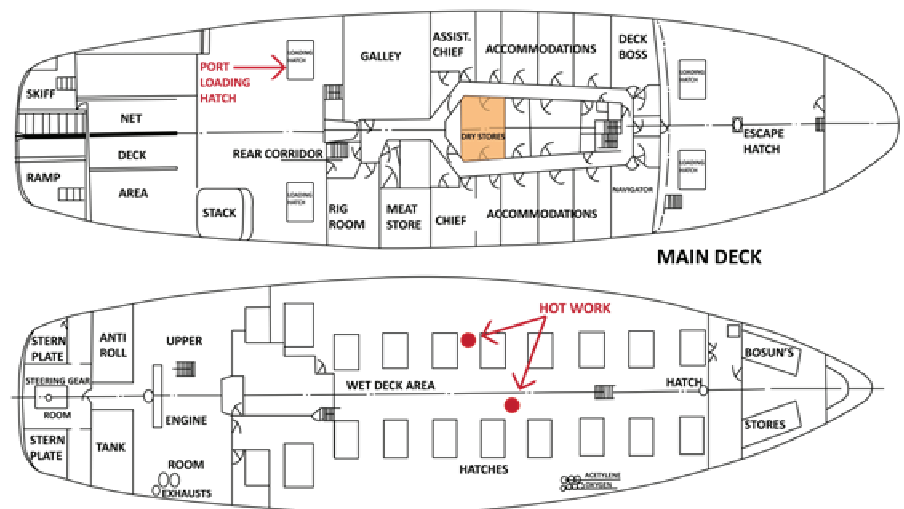


Figure 102. Vessel deck plans modified for clarity and to show the location where the hot work occurred on the wet deck (represented by red circles) and the location of the dry stores locker where the fire was discovered on the main deck above (shaded in orange). Note the port loading hatch on the main deck, where water entered and caused listing.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**OTHER**

Pipeline Breach and Subsequent Fire aboard Cutter Suction Dredge ***Jonathon King Boyd*** and Towboat ***Bayou Chevron***

LOCATION	
MATAGORDA BAY, TEXAS	
ACCIDENT DATE **APRIL 17, 2018**	REPORT NUMBER **MAB 19/19**
ACCIDENT ID **DCA18FM021**	ISSUED **JULY 16, 2019**

Figure 103. *Jonathon King Boyd* in Port Lavaca, Texas, before the accident. In this photo, towboat *Bayou Chevron* is positioned on the dredge's starboard side. SOURCE: RLB CONTRACTING INC.

Figure 104. *Jonathon King Boyd* **burns after striking a submarine gas pipeline.** SOURCE: COAST GUARD VIDEO

On the evening of April 17, 2018, the cutter suction dredge ***Jonathon King Boyd*** punctured a submarine natural gas pipeline with a spud during dredging operations in Matagorda Bay, Texas. A gas plume ignited and engulfed the dredge and its accompanying towboat, the ***Bayou Chevron***. All 10 crewmembers abandoned the vessels uninjured. Damage to the pipeline was estimated at $1.7 million. The ***Jonathon King Boyd*** and the ***Bayou Chevron*** were constructive total losses, valued at $5.5 million and $125,000 respectively.

RLB Contracting was under contract with the US Army Corps of Engineers to dredge about 247,000 cubic yards of sand in the Gulf Intracoastal Waterway at the Matagorda Ship Channel intersection. The project started on March 30 and was anticipated to last about 5 weeks. The dredge ***Jonathon King Boyd*** was moved to the work site by the towboat ***Bayou Chevron***. About 8,000 feet of pipeline for dredge discharge had been put in place off the dredge's port quarter.

Dredging was performed using a hydraulic cutterhead controlled by a leverman. The leverman advanced the dredge by using anchors at the bow and two steel-pipe spuds at the stern. One of the spuds would be dropped into the channel bottom to pivot the dredge; alternating pivot moves "walked" the dredge forward.

On the morning of April 17, ten days into their rotation, the captain and crew started their day as normal. About 1845, with the port spud down, the deckhand noticed bubbles rising from the water off the stern. He notified the leverman, who stopped operations and went to the stern to investigate. The ***Bayou Chevron*** was tied off on the dredge's port side. The deckhand and the leverman believed they had a break in the dredge's flexible discharge pipeline directly off the stern. The leverman informed the captain, who instructed the crew to cease operation and replace the pipeline with a spare located on a nearby supply barge.

The leverman and engineer went to look at the nautical charts where they discovered a charted submarine pipeline at their location. They informed the captain, who then ordered the mate and deckhand (who were aboard the supporting vessel ***First State*** returning with spare pipe) to pick up the anchors and move the dredge away from that location. The captain contacted the company, who in turn notified the Coast Guard, National Response Center, and Texas General Land Office.

As the crew prepared to move the dredge and the leverman raised the port spud, a geyser of gas and water erupted from the stern of the vessel. The crew immediately smelled gas and headed for the muster station, and the mate and the deckhand returned to the vessel. Shortly thereafter, about 2014, fire erupted near the stern of the dredge port side. All 10 crewmembers were accounted for and abandoned the dredge to the ***First State***, which then quickly moved away as fire consumed the dredge and the ***Bayou Chevron***.

The pipeline owner manually shut down the affected section of the pipeline; the onshore valve was closed on April 17, and the offshore valve was closed the next day. The fire continued into the night until April 18 at 1400, when it was extinguished. The fire-damaged ***Bayou Chevron*** was later located aground at Sand Point. By mid-afternoon the following day, the dredge had been moved for fuel removal and damage assessment.

RLB Contracting was required to alert the Texas Notification System before commencing the accident section of the dredging project. However, based on the evidence, this notification did not take place. Neither the company nor the Texas Notification System was able to locate a ticket for the dredging location where the accident occurred.

The crew utilized HYPACK software, which provided user interface between hydrographic surveys, data files, project files, and tracking of dredge operations. The company typically reviewed Corps of Engineers-provided drawings to identify utilities and other hazards, and incorporated those in HYPACK. At the time of the accident, the captain and crew relied solely on the HYPACK software while conducting dredging operations. Despite this reliance, before dredging, RLB Contracting did not incorporate files into the HYPACK software from the provided contract drawings that identified the locations of the submerged pipelines.

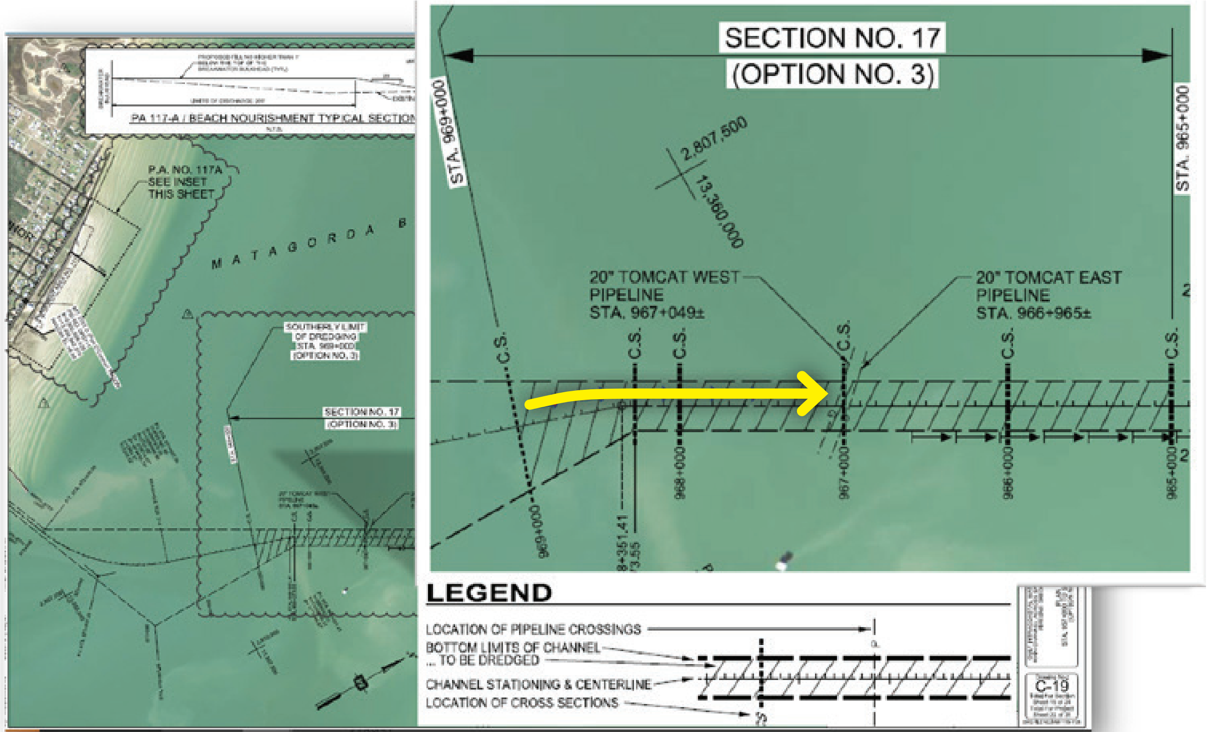


Figure 105. Extracts from Corps of Engineers Drawing No. C-19 depicting the dredging plan for Option No. 3, Section No. 17 for the Gulf Intracoastal Waterway. The yellow arrow displays *Jonathon King Boyd*'s easterly dredging trajectory, commencing at the southern section (STA. 969+000).

Pipeline positions could, and as per company policy should, have been entered into the HYPACK software, but according to the crew, the positions were not displayed in the software they had. According to the company, the production engineer was responsible for entering the location of utilities and that information was typically provided to them at the beginning of the project. RLB Contracting relied on a single shoreside individual (the production engineer) to carry out appropriate notifications and to input the data for the vessel software, which, in this instance, led to a single-point failure.

The probable cause of the fire aboard the cutter suction dredge *Jonathon King Boyd* was RLB Contracting's failure to inform the crew about utilities in the area due to ineffective oversight, which led to dropping a spud onto a buried submarine pipeline, causing natural gas to release and ignite.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**TOWING/BARGE**

Engine Room Fire on Board Towing Vessel *Leland Speakes*

LOCATION	
LOWER MISSISSIPPI RIVER, MILE 520.6, 16 MILES SOUTH OF GREENVILLE, MISSISSIPPI	
ACCIDENT DATE	REPORT NUMBER
FEBRUARY 21, 2018	**MAB 19/10**
ACCIDENT ID	ISSUED
DCA18FM014	**MAY 15, 2019**

Figure 106. Fire on starboard side of vessel.
SOURCE: LESLIE JENKINS, JANTRAN INC.

Figure 107. *Leland Speakes* on fire after abandonment. SOURCE: LESLIE JENKINS, JANTRAN INC.

On February 21, 2018, at 0740, the towing vessel *Leland Speakes* was pushing 21 barges upbound on the Lower Mississippi River when a fire broke out in the engine room at mile 520.6, south of Greenville, Mississippi. The nine crewmembers on board tried to fight the fire but, unable to control it, abandoned the vessel to a skiff dispatched from a Good Samaritan towboat. The abandoned tow drifted 11 miles downriver until another towing vessel pushed it into a sandbar. The fire burned until later that evening before being extinguished by fire response teams and vessels. None of the crewmembers were injured, and no environmental damage was reported. The damage to the *Leland Speakes* was estimated at $4.5–5 million.

Early morning on February 21, the *Leland Speakes* tow was enroute to the Jantran facility near mile 585 in Rosedale Mississippi. At 0445, the engineer conducted a daily check of the engine room, then emailed a report from the wheelhouse and passed back through the engineroom before 0730. All was normal, and the engines were at a typical transit rpm of 900 each.

About 0740, crewmembers heard an "explosion" that was followed by the port main engine alarm, the automatic fire detection alarm and black smoke and flames seen near the port engine. The crew responded, but smoke, flames and heat prevented entry to engine room from the interior entrance and the open doors on the main deck were engulfed in flames.

The engineer activated the emergency quick closing valves for the port main engine fuel supply and the engine room portside supply fan electrical power cutoff. He left the starboard engine's fuel supply and fans online so the captain retained maneuvering ability. Intending to maintain electrical power as well, he did not activate the electrical generators fuel cutoffs. He closed two engine room windows but was unable to close others due to the smoke billowing out of them. However, given that they were residential type, they would have likely failed in the large fire. Also, although stopping all fans may have reduced air to the fire, the engine room inlets and exhaust vents would have remained open, as the vessel design did not incorporate any means, such as dampers, to effectively close off air supply to the engine room.

The captain slowed the engines and attempted to maneuver as the tow began to top around, but the vessel had lost steering. He radioed for assistance and a nearby towing vessel launched their skiff to assist. The crew stretched out hoses to fight the fire, but the fire pump located in the engine room would not remotely start. The crew could also not reach the two semi-portable fire extinguishers located in the engine room and discharging portable extinguishers had no effect. They rigged portable pumps to discharge into the engine room, but about this time the captain feared that the barge wires would break from tow contact with the bank and ordered them onto the barges. Shortly thereafter, the captain determined that without propulsion, steering, or an operating fire pump, the vessel should be evacuated and left the wheelhouse (about 20 minutes after the fire started). He accounted all crewmembers at a muster and with the assistance from two Good Samaritan towboats departed the tow.

The ***Leland Speakes***' two main engines were EMD two-stroke, mechanically controlled, 16 cylinder 645 E7B's. The "explosion" that occurred was caused by a mechanical failure of the port main engine when piston rod connecting caps failed and components breeched the crankcase, resulting in subsequent ignition of fuel and lube oil off the hot engine. The engine was overhauled about 14 months before, in accordance with company practices, which included procedures and checks in addition to the manufacturer's guidance to ensure proper torqueing of engine components.

Although leaving engine room doors and windows risks expanding engine room fires by allowing a continued supply of oxygen, the crew did so regularly to cool the engine room. This practice, also found on other inland towboats, indicates that the engine room ventilation system was under-designed for some ambient conditions the ***Leland Speakes*** operated in.

The engine room fire's location and immediate intensity likely damaged the wiring to the vessel's single fire pump, rendering it inoperative, and leaving the crew without their primary means to extinguish the fire—water hoses. Had it started, the sole means to try to extinguish the fire would have been to place hoses through an engine room door or window. On smaller vessels, such as towboats, the risk to crews fighting engine room fires has led to the development of designs that incorporate both a means for shutting down ventilation to the engine room and a fire suppression system, such as a fixed CO_2 system, to extinguish the fire without requiring crews to enter the space. The vessel did not have a fixed CO_2 fire-extinguishing system for the engine room. Instead, as allowed by Subchapter M regulations, the towboat was equipped with two semiportable extinguishers in the engine room, which were inaccessible. Regardless, they were likely insufficient to extinguish the fire.

The probable cause of the engine room fire on board the *Leland Speakes* was a catastrophic failure and crankcase breach of the port main engine resulting from failure of the caps that secured two piston connecting rods to the crankshaft. Contributing to the severity of the fire was the vessel's lack of a fixed fire-extinguishing system for the engine room and lack of redundant fire pumps.

Figure 108. *Leland Speakes* before the accident.
SOURCE: DAVID L., DICK'S TOWBOAT GALLERY

Figure 110. *Leland Speakes* on fire and abandoned at 1249.
SOURCE: LESLIE JENKINS, JANTRAN INC.

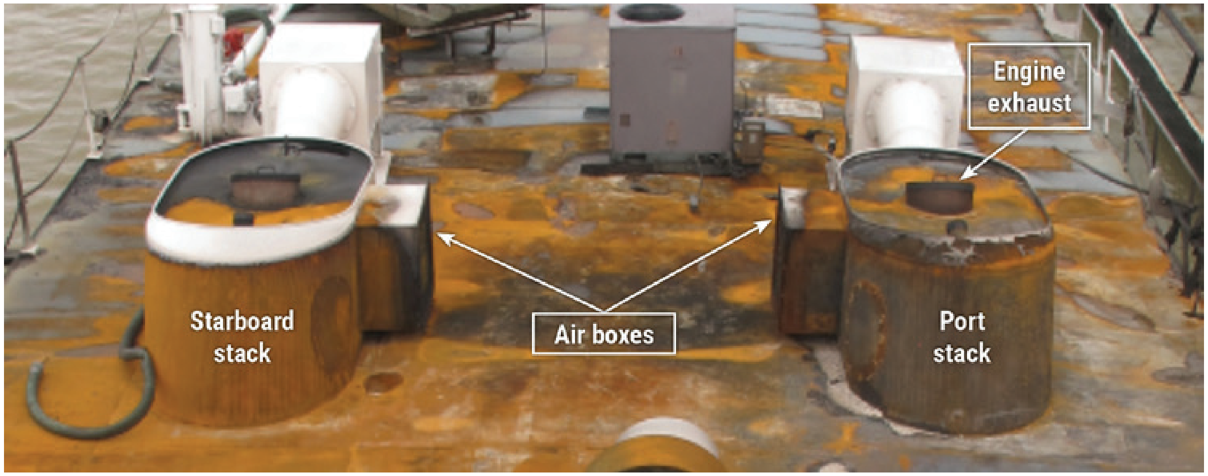


Figure 109. Looking aft at stacks and air boxes post-fire.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire aboard Fish Tender ***Logger***

LOCATION	
BERING SEA, ABOUT 55 MILES WEST OF PORT MOLLER, ALASKA	
ACCIDENT DATE	REPORT NUMBER
JULY 28, 2018	**MAB 19/18**
ACCIDENT ID	ISSUED
DCA18FM030	**JUNE 26, 2019**

Figure 111. ***Logger*** **before accident.** SOURCE: CHARLIE ALLEN, MARINETRAFFIC.COM

On July 28, 2018, about 0500 local time, the fish tender ***Logger*** caught fire while under way in the Bering Sea off the coast of the Alaska Peninsula, about 55 miles west of Port Moller, Alaska. The crew of three attempted to fight the fire with portable extinguishers; however, unsuccessful, they evacuated to a nearby fishing vessel that had been sailing with them. There were no reports of injuries or pollution. The ***Logger***, valued at an estimated $450,000, eventually sank and was declared a total loss.

On the morning of July 28, the ***Logger*** was traveling to the next segment of the vessel's fish tender contract in Petersburg, Alaska, along with the fish tender ***Arctic Dawn***. While under way, the captain and two deckhands on the ***Logger*** each rotated through a navigation watch in the wheelhouse while the other two rested.

The newer of the two deckhands came on watch in the wheelhouse about 0400. He made a round through the engine room, and about 0430, he smelled smoke from beneath the wheelhouse. The deckhand left the vessel in autopilot and went down into the galley area to investigate. He met the other deckhand on his way, and from a wooden door in the galley that led down into the engine room, both deckhands saw smoke. They opened the door and saw a fire progressing up the stairs.

The captain was awakened by the deckhands calling out to him. He opened the door to the engine room and grabbed a portable dry chemical fire extinguisher and discharged it down the stairs. After closing the door to prevent more smoke from filling the galley, he and the deckhands went to the wheelhouse. From there, he instructed one of the deckhands to throw a fire extinguisher grenade into the engine room from a door on the outer main deck that led into the engine space. The grenade had little effect. The crew continued to discharge portable dry chemical fire extinguishers into the engine room until there were none left. They could not see from where the fire originated.

In the wheelhouse, the ***Logger***'s captain contacted the crew on the ***Arctic Dawn*** to request assistance. The captain then heard an explosion, and the radios lost power. Shortly afterward, he heard the heat-activated halon fire-extinguishing system activate in the engine room. Both the main engines and the accommodation generator stopped running at that time, leaving the vessel drifting and completely in the dark. The ventilation closures for the engine room were manually operated and could not be closed due to the smoke and heat in the area.

As the heat and smoke continued to fill the deckhouse and wheelhouse, the captain and deckhands exited to the main deck and made their way forward to the bow. About 5–7 minutes had passed between the time he was awakened to the time they reached the bow. The wheelhouse, galley, and lower deck were engulfed in flames. Smoke was emanating from wooden planks fitted onto the main deck forward of the house, an indicator that the fire was in the space below the main deck in addition to the engine room.

The ***Arctic Dawn*** pulled up to the port side of the ***Logger***, allowing the ***Logger*** crew to evacuate their burning vessel. The Coast Guard was notified of the fire at 0511. The ***Arctic Dawn*** remained on scene until about 0700. When they departed, the ***Logger*** was still burning on the surface of the water. The next day, the Coast Guard conducted a flyover of the area but did not find any sign of the wreckage.

Before the fire was discovered, no fire detection alarms sounded, which would have given an indication of the compartment in which the fire originated. Since the vessel burned completely and sank in an unknown location, and underwater survey or recovery efforts were not undertaken, investigators were unable to determine the source and cause of the fire.

Figure 112. Photo from a 2016 survey report documenting the condition of *Logger* shows wooden deck boards on the main deck, from where the captain saw smoke emanating.

The captain surmised that the fire may have been started by wiring that led to the forepeak for the fish hold pumps, based on the smoke he saw emanating from the main deck and the wooden planks on the main deck, which indicated to him that there may have been a fire below the deck. He noted that the fire had to be substantial in size for smoke to penetrate the deck. However, he stated that the fire spread so rapidly that he could not confirm this possibility with certainty.

The fire aboard the fish tender *Logger* likely originated in the engine room from an unknown source.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire aboard and Subequent Sinking of Fishing Vessel ***Master D***

LOCATION	
GULF OF MEXICO, 45 MILES SOUTHEAST OF SOUTH PADRE ISLAND, TEXAS	
ACCIDENT DATE	REPORT NUMBER
AUGUST 31, 2018	**MAB 19/21**
ACCIDENT ID	ISSUED
DCA18FM0037	**JULY 30, 2019**

Figure 113. Red parachute flare above the *Master D* seen by the Coast Guard cutter. Source: Coast Guard

Figure 114. *Master D* burning on the day after the crew rescue. Source: Coast Guard

About 0030 local time on August 31, 2018, the fishing vessel ***Master D*** was transiting with three crewmembers in the Gulf of Mexico 45 miles southeast of South Padre Island, Texas, when a fire in the engine room was discovered. After unsuccessfully trying to extinguish the fire, the crew abandoned the vessel without injury. The fire continued to burn until the vessel sank the next day. An oil sheen approximately 400 yards by 1 mile was visible in the water after the sinking. The estimated property damage exceeded $162,000.

Prior to the accident voyage, the captain had notified the company that there was a lubricating oil leak on a seal on the vessel's single diesel generator. The company contracted a mechanic to repair the seal while the vessel was at the dock. However, prior to departure, the captain noticed that the oil leak continued, but he thought the issue was manageable.

On August 30, about 2100, the electrically powered winch used to position the sample net lost power. At the same time, the lights on the stern began to dim and flicker, before they too went out. The crew found that the electrical breakers to the winch and lights in the engine room had tripped. Due to the electrical problems, the captain decided not to redeploy the sample net.

About three and a half hours later, at 0030, while on watch, the captain noticed that electricity in the wheelhouse was lost. On the way to the engine room, he encountered a burning odor. Shortly thereafter, the engine room fire alarm and the generator failure alarm sounded.

The captain and deckhand discovered that the engine room was filled with smoke and flames and saw sparks being emitted from overhead cables inside the space. The captain stated that the fire seemed to be coming from the area around the generator.

While the two deckhands tried to control the fire with portable drypowder fire extinguishers, the captain prepared the liferaft, so that they could abandon the vessel if the fire was not extinguished and retrieved the EPIRB from its mount and activated the alert, which was received by the Coast Guard at 0150.

After all five fire extinguishers were expended, the captain and the deckhands recognized that they had to abandon ship. After removing the fill covers from the fuel tanks they made their way to the stern and put the liferaft into the water, inflated it, and abandoned the vessel, approximately an hour after the fire was discovered.

Once in the liferaft, the crewmembers started to set off flares in hopes that other vessels in the area would respond. Although they tried to maneuver the liferaft away from the burning vessel, the current prevented them from getting far from the *Master D*.

For about 2 hours in the darkness, the crewmembers tried to signal other vessels. At 0330, the Coast Guard cutter *Coho* rescued the crewmembers. The fire continued to burn until the vessel sank at 0530 the next day.

Based on the location of the flames seen by the captain, along with the intensity of the fire and smoke when it was discovered shortly after the power went out on the bridge, the fire most likely started at the generator. As noted by the captain, the generator had a lube oil leak, which was not properly repaired prior to the accident voyage. Although the source of the ignition could not be determined, there would have been several hot surfaces around both the operating main engine and the generator to ignite a fuel or lube oil leak from either engine. The final loss of power was most likely a result of fire damage to the generator and/or the electrical distribution system near it.

Because the vessel was not fitted with fuel shutoff valves that were remotely operable, the crew had no way of securing the fuel supply to the diesel engines from outside of the engine compartment once the fire expanded. The fire's expansion to the wooden frames, furniture, and dry supplies located inside the forepeak, which included 120 gallons of lube oil, provided additional fuel to sustain the fire. Even as the vessel sank, the fire continued to burn.

The destruction of the nonmetallic hoses connecting intake piping to the vessel's through-hull fittings, due to the long-term exposure to the heat of the fire, most likely resulted in the sinking of the vessel. As nonmetallic hoses failed, water would have entered the hull, causing the vessel to slowly sink.

The probable cause of the fire aboard the fishing vessel *Master D* was leaking lube oil from the diesel generator that contacted a hot engine surface and ignited. Contributing to the eventual sinking was the failure of fire-damaged nonmetallic hoses connected to through-hull fittings below the waterline.

Figure 115. *Master D* on fire while the crew is rescued by the Coast Guard. SOURCE: COAST GUARD

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire and Sinking of Fishing Vessel ***Ole Betts Sea***

LOCATION	
GULF OF MEXICO, 18 MILES NORTHEAST OF GARDEN KEY, DRY TORTUGAS, FLORIDA KEYS	
ACCIDENT DATE	REPORT NUMBER
MARCH 18, 2018	**MAB 19/05**
ACCIDENT ID	ISSUED
DCA18FM018	**MARCH 26, 2019**

Figure 116. Burning hull of *Ole Betts Sea*.
Source: Trico Seafood, Inc.

Figure 117. Burning hull of *Ole Betts Sea*. Source: Trico Seafood, Inc.

About 0615 local time on March 18, 2018, a fire broke out in the engine room of the commercial fishing vessel ***Ole Betts Sea*** while it was trawling in the eastern Gulf of Mexico. Unable to contain the fire, the crew of three abandoned the vessel to a liferaft about an hour later and were rescued by a Good Samaritan vessel. After burning for about 16 hours, the vessel sank approximately 18 miles northeast of the island of Garden Key, Dry Tortugas, Florida. No pollution or injuries were reported. The vessel was a total loss valued at $200,000.

About 0615, while the captain was resting, one of the vessel's two rigmen, who was at the helm, heard something that sounded like a small "boom" or "heavy thud." The captain returned to the wheelhouse and told the rigmen to pull in the nets and gear. Lighting remained on and the vessel's main engine continued to propel the boat. About a minute later, the vessel started shaking. While the rigmen retrieved the rig, small boom-like noises emanated from the engine room. The captain was unable to move the throttle to neutral and stop the main propulsion engine from the wheelhouse. The vessel continued making a speed of about 2.5 knots.

The captain went to the engine room door and found thick, grayish smoke, which prevented him from entering the space, so he closed the door. The captain called another nearby fishing vessel on VHF radio from the wheelhouse.

About 3 minutes after the shaking began, it stopped, and the lights went out; yet the main engine continued to propel the boat. The captain lowered discharging dry-chemical fire extinguishers into the forepeak compartment and closed the hatch in an attempt to extinguish the fire. He could not access the engine room further aft due to heavy smoke and heat. The vessel did not have, nor was it required to have, a fixed fire-extinguishing system for the engine room.

The fire did not abate and, a short time later, a large explosion occurred. Thick, black smoke emerged from the engine room, and the vessel stopped. One rigman abandoned the boat into the liferaft. The captain and the other rigman jumped into the water and held onto the liferaft. At 0731, the crew of a nearby Good Samaritan vessel notified the Coast Guard of the fire and, at 0740, took the crew aboard their vessel. Two fishing boats attempted to fight the fire by spraying water onto the burning trawler until about 1140, when they ceased their efforts due to the fire's intensification. The fire continued to burn until about 2110, when there was a large explosion, and the *Ole Betts Sea* sank.

The *Ole Betts Sea* was not salvaged, and thus it was not possible to determine the exact cause of the fire. However, based on the sequence of events, sounds, and vibrations reported by the crew, investigators developed a likely cause for the initiating "boom," heavy gray smoke, and subsequent explosion and fire that burned out of control.

There was insufficient evidence to pinpoint the cause of the initial noise and source of gray smoke. It is likely that the cause was a mechanical failure in either the Caterpillar propulsion diesel engine or the generator's Detroit diesel engine.

Considering the shaking of the vessel that occurred about 1 minute after the initial "boom" noise, investigators believed that the only pieces of engine room equipment large enough to generate the type of vibration described by the crew were the diesel engines or propulsion shafting. Because the shaking stopped before the propulsion diesel engine ceased operating and the vessel ceased forward movement, it is believed that the shaking was caused by a failure in the diesel engine driving the generator. Since the lights continued to operate until the vibration (diesel generator) stopped, it is unlikely that the generator itself failed.

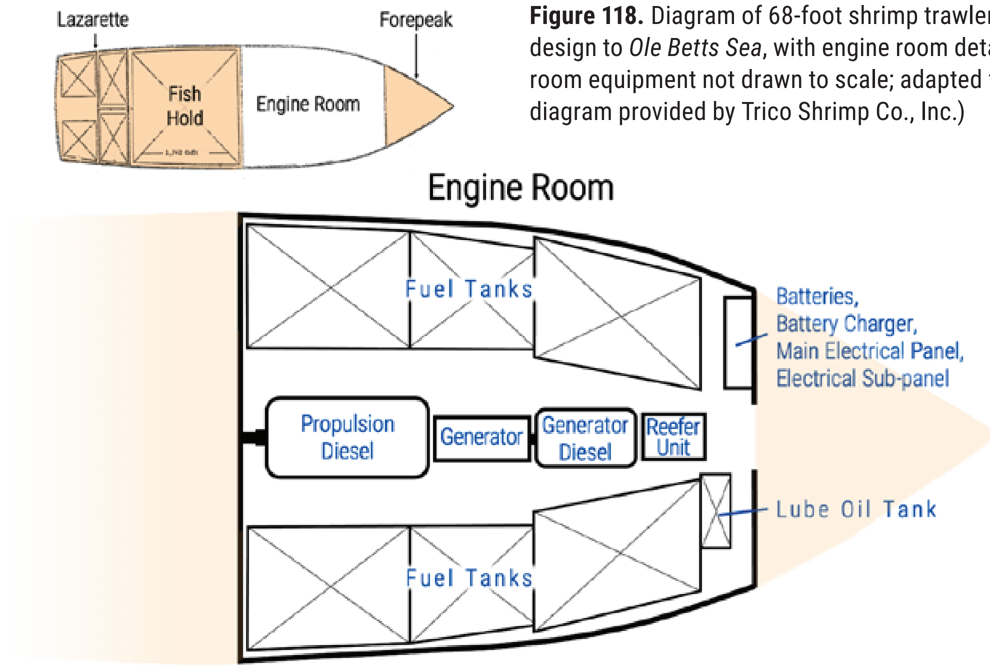


Figure 118. Diagram of 68-foot shrimp trawler of similar design to *Ole Betts Sea*, with engine room detail. (Engine room equipment not drawn to scale; adapted from hull diagram provided by Trico Shrimp Co., Inc.)

The fire was likely fed by diesel oil from a failed fuel line to the propulsion or generator diesel engines. Investigators noted that there was no way for the crew to shut off the fuel flow to the diesel engines, such as a remote quick-closing (cut-off) valve, outside of the engine compartment. Depriving the fire of fuel, especially during the early stages of the incident, could have prevented further ignition of flammable materials and increased the likelihood of saving the vessel.

The probable cause of the fire and sinking of fishing vessel *Ole Betts Sea* was a mechanical failure of the generator's diesel engine, which led to a fuel-fed fire that burned out of control.

REMOTE FUEL OIL AND LUBE OIL CUT-OFFS

Following the initiation of an engine room fire, it is imperative to remove the source of available fuel to the fire found in the fuel oil and lube oil systems. In this accident, the vessel had no remote emergency cut-off valves for fuel and lube oil systems outside the engine room, and thus fuel to the fire could not be stopped and the vessel was eventually consumed by the flames. Vessel designers, builders, owners, and operators are encouraged to install, regularly test, and have emergency drills that incorporate remote cut-off valves for fuel and lube oil lines.

ACCIDENT TYPE	VESSEL GROUP
FIRE/EXPLOSION	**FISHING**

Fire aboard Fishing Vessel ***Rose Marie***

LOCATION **ATLANTIC OCEAN, 67 MILES EAST OF CHATHAM, MASSACHUSETTS**	
ACCIDENT DATE **AUGUST 23, 2018**	REPORT NUMBER **MAB 19/24**
ACCIDENT ID **DCA18FM033**	ISSUED **SEPTEMBER 4, 2019**

Figure 119. *Rose Marie* before the accident.
Source: Rose Marie Inc.

About 1030 local time on August 23, 2018, a fire occurred in the engine room of the fishing vessel *Rose Marie* while trawling in the Atlantic Ocean 67 miles east of Chatham, Massachusetts. When efforts to fight the fire proved unsuccessful, all four crewmembers abandoned the vessel to a liferaft without injury and were rescued by a Good Samaritan vessel. The fire eventually burned itself out, and the vessel was then towed into port. The *Rose Marie,* valued at an estimated $700,000, was declared a constructive total loss.

The *Rose Marie*, with a captain, a mate, and two deckhands, arrived at Georges Bank on August 23 at 0545 to trawl for ground fish. Each catch would be hauled in with the vessel's hydraulically powered net drums. The lines (pipes) for the hydraulic system ran above the main engine.

About 1030, the crew lowered the net to begin the fourth tow of the day. Around this time, one of the deckhands saw black smoke emanating from the engine room vent behind the wheelhouse. The captain found the engine room was full of black smoke and radioed the Coast Guard as black smoke entered the wheelhouse. On board were eight handheld fire extinguishers (six dry chemical and two CO_2) and one grenade-type aerosol extinguisher.

To extinguish the fire, the crew tossed the aerosol extinguisher into the engine room through the open door and discharged one portable extinguisher into the engine room vent behind the wheelhouse. Next, the crew discharged the five additional extinguishers at the base of the cable trunk in the accommodation space. Flames prevented them from reaching the two CO_2 fire extinguishers.

Despite the crew's efforts, the fire spread to the galley through the rectangular-shaped, plywood cable trunk. Once the fire reached the galley, it spread to the wheelhouse through both the trunk and the wooden stairwell that connected the two decks. After depleting the six available fire extinguishers, the crewmembers attempted to use the two washdown hoses on the main deck. However, both hoses had no pressure.

Figure 120. Video screenshot of the *Rose Marie* from the Coast Guard's aircraft, which had been dispatched to the fire. The camera's crosshairs capture the flames consuming the net on the drum. Source: Coast Guard

Within 10 minutes of the flames reaching the galley, the crewmembers abandoned the vessel into a liferaft and paddled away from the burning vessel. Thirty minutes later, a Good Samaritan vessel took them on board.

At 1425, a Coast Guard cutter arrived on scene and engaged in firefighting operations but stopped 25 minutes later, based on the concern that the firefighting water could flood and sink the vessel. At 0934 the next day, the vessel was towed to the Port of Fairhaven, Massachusetts.

Investigators identified two possible ignition sources for the fire, which propagated through the cable trunk. First, a fluid leak from the net drum's hydraulic system could have ignited, as evidenced by the location of the system pipes that ran above the main engine and the observed black smoke emanating from the engine room just after the drum had been operated. A second potential source was the electrical wiring above the main engine at the base of the cable trunk. The investigation found significant damage to the copper core wiring, which could have resulted from arcing, and ignited adjacent flammable material or the wood at the base of the trunk. The flames then would have spread to the rest of the vessel through the cable trunk. Investigators concluded that an electrical ignition source was more likely than a hydraulic fluid leak because of (1) the heat required to generate the initial cable trunk fire and (2) the fire damage in the vicinity of the base of the trunk compared to the minimal damage near the main engine.

Flames cannot spread easily through insulated steel decks or bulkheads. The deck between the accommodation space and the wheelhouse was steel, but the cable trunk running through it was constructed of uninsulated flammable material (wood). Had the trunk opening been sealed and its surrounding structure insulated with fire-retardant materials, the fire would not have been able to rapidly spread, and damage may have been limited to the engine room.

Crewmembers attempted to fight the fire using a grenade-type aerosol extinguisher rated for spaces up to 5,300 cubic feet in volume. The manufacturer recommended that spaces be sealed completely when using the handheld aerosol grenade, yet the engine room door and vents remained open throughout the fire, rendering the extinguisher ineffective.

The probable cause of the fire aboard the fishing vessel *Rose Marie* was arcing of an electrical wire in the engine room overhead igniting a wooden cable trunk. Contributing to the severity of the damage was the installation of a trunk that compromised the steel boundary of the engine room, allowing the flames to spread to the combustible materials in the upper decks.

SECURING VENTILATION AND OPENINGS WHEN USING THROWABLE AEROSOL FIRE EXTINGUISHERS

Grenade-type aerosol fire extinguishers were used to fight engine room fires in this accident and an earlier fire on the fishing vessel *Logger*—but did not extinguish the fire in either accident. In both cases, the crews did not close all openings, such as engine room doors and other ventilation, thus reducing the effectiveness of the extinguisher. When using such devices or designing any vessel space for the prevention of fires, vessel owners and operators should identify openings, provide means to ensure they can be properly secured in order to contain a fire, and train crewmembers on how to secure them during a fire emergency.

Figure 121. The sequence of the fire's path can be traced in these images as flames (1) began above the main engine in the engine room, (2) traveled trhough the wooden cable trunk opening overhead, (3) entered the accommodation space through the cable trunk opening, (4) spread through the galley and throughout the accommodation space, and (5) entered the wheelhouse through the cable trunk and lader access.

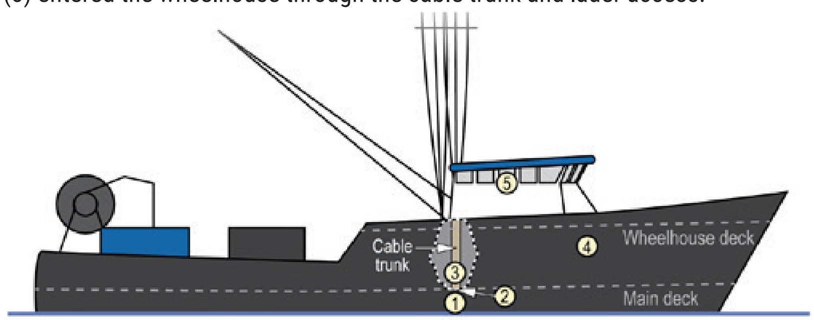


Figure 122. Below: grenade-type aerosol fire extinguisher used initially to combat the fire sits on the deck of the engine room near the entrance ladder. Inset: two photos from the manufacturer's website demonstrate how the device activates.

ACCIDENT TYPE	VESSEL GROUP
FLOODING	**FISHING**

Flooding and Sinking of Fishing Vessel ***Aaron & Melissa II***

LOCATION	
GULF OF MAINE, 70 NAUTICAL MILES SOUTHEAST OF PORTLAND, MAINE	
ACCIDENT DATE	REPORT NUMBER
NOVEMBER 14, 2018	**MAB 19/34**
ACCIDENT ID	ISSUED
DCA19FM006	**NOVEMBER 14, 2019**

About 0800 local time on November 14, 2018, the fishing vessel *Aaron & Melissa II* sank approximately 70 miles southeast of Portland, Maine, after it flooded while transiting to fishing grounds during a storm with gale-force winds. All four crewmembers abandoned ship and entered an inflatable liferaft when attempts to dewater the vessel proved unsuccessful; they were later rescued by a US Coast Guard helicopter. One deckhand received minor injuries. Approximately 3,000 gallons of fuel and lube oil were discharged. The loss of the vessel was estimated at $650,000.

On November 8, the *Aaron & Melissa II* left the Port of Gloucester, Massachusetts, with a crew of four, including a captain, a senior deckhand, a junior deckhand, and an engineer, en route to fishing grounds approximately 60 miles offshore from Rockland, Maine. By November 13, the crew had 35,000 pounds of haddock on board.

The NOAA had broadcasted a warning of gale-force winds with wave heights of 10 feet in the area, effective at 1400 that day. The crew was aware of the forecast, but the captain decided to check one more fishing spot located northeast of Gloucester.

At 1530, the captain assigned the junior deckhand to stand watch in the wheelhouse and went to sleep. The senior deckhand relieved the junior deckhand at 2000. The captain entered the bridge at 2045, noted the deteriorating weather, and reminded the senior deckhand to look for water pooling behind the wheelhouse, which was an indicator that the port and starboard lobster tanks were filling with seawater through their covers. He then returned to bed.

Figure 123. *Aaron & Melissa II* prior to sinking.

About 2300, the senior deckhand noticed that the vessel was becoming "heavy in the stern." He woke the engineer went into the engine room and turned on the bilge pump to empty the lobster tanks. When the senior deckhand returned to the wheelhouse, he noticed that the covers to both lobster tanks were no longer in place. Shortly after midnight, the crew found the lazarette was half full of water. The engineer arranged the bilge system to pump out the lazarette. The deckhands finished securing the covers to the lobster tanks about 0100 and then went to bed, leaving the engineer on watch.

At 0200, waves hitting the stern of the vessel sheared the pins holding the port and starboard stern ramp gates closed, letting them open, and increasing the amount of water on the deck. The crew was able to secure the two stern ramp gates using rebar, but the makeshift rebar pins kept breaking. About the same time, the port lobster tank cover loosened again and moved off the tank opening.

The engineer realized that the bilge system was not removing any water from the flooded lazarette and woke the captain around 0300. The captain changed the vessel's course to head back to Gloucester. He went down into the engine room and found a suction valve to the engine room's dry bilge in the open position. He closed the valve but was unable to gain pump suction. Although the captain tried to utilize the other two bilge pumps, he was unable to get suction.

At 0500, the vessel started to list to starboard. The captain attempted to maneuver the vessel to reduce the effect the winds and waves were having on the vessel. About 2 hours later, the vessel listed further to starboard, and the hatch cover for the fish hold dislodged, allowing water to enter and increase the starboard list. At 0745, the Coast Guard responded to a mayday call from the vessel on VHF channel 16.

With the vessel listing to starboard and no ability to dewater the flooded compartments, at 0800, all four crewmembers abandoned the vessel just as it began to sink beneath the waves, stern first. A Coast Guard helicopter rescued them at about 1000; the weather conditions involved wind speeds of 30 knots with wave heights of 20 feet.

Based on the captain and crew's descriptions, the saltwater/bilge system started to show the effects of a clog prior to the vessel encountering the storm. Most likely, the piping system was clogged before the manifold, which prevented all three pumps from being able to dewater the lazarette and the lobster tanks.

The gale the vessel encountered was accurately forecasted. The captain was aware of the approaching storm but nevertheless decided to head to another location to fish, putting the vessel at risk. The gale-force storm and sea conditions damaged the stern gates and flooded the lobster tanks, fish holds, and lazarette, leading ultimately to the vessel sinking and endangering its crew. In addition, critical systems such as the high-water bilge alarm within the lazarette and the saltwater/bilge system were not fully operational likely due to fouling, which also decreased the survivability of the vessel.

The probable cause of the flooding and sinking of the fishing vessel *Aaron & Melissa II* was the captain's decision not to return directly to port with forecasted galeforce conditions, combined with the clogged bilge system, which prevented the crew from dewatering the flooded lazarette.

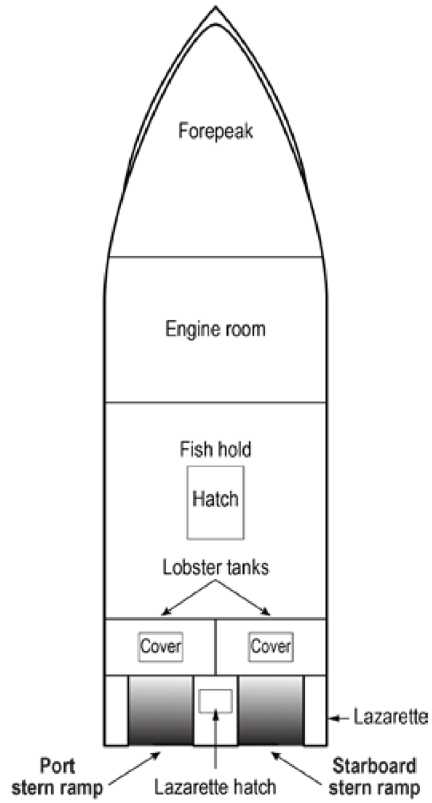


Figure 124. Schematic of *Aaron & Melissa II*.

Figure 125. Aft view showing the ramp gates.

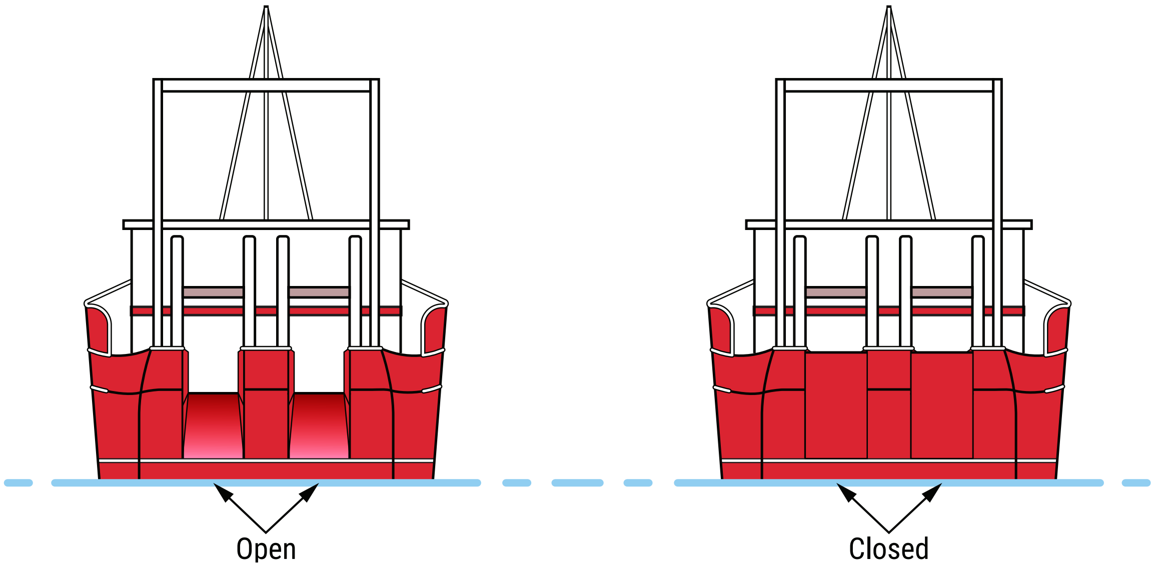


Figure 126. A diagram of the stern ramp gates in the open (at left) and closed (at right) positions.

ACCIDENT TYPE	VESSEL GROUP
FLOODING	**TOWING/BARGE**

Flooding and Sinking of Towing Vessel *Ms Nancy C*

LOCATION	
EVERETT LAKE, MILE 832 ON LOWER MISSISSIPPI RIVER, NEAR DYERSVILLE, TENNESSEE	
ACCIDENT DATE **MARCH 6, 2018**	REPORT NUMBER **MAB 19/03**
ACCIDENT ID **DCA18FM015**	ISSUED **MARCH 6, 2019**

Figure 127. *Ms Nancy C* under way prior to sinking.
SOURCE: FRANK KAMMERER, TOWBOATGALLERY.COM

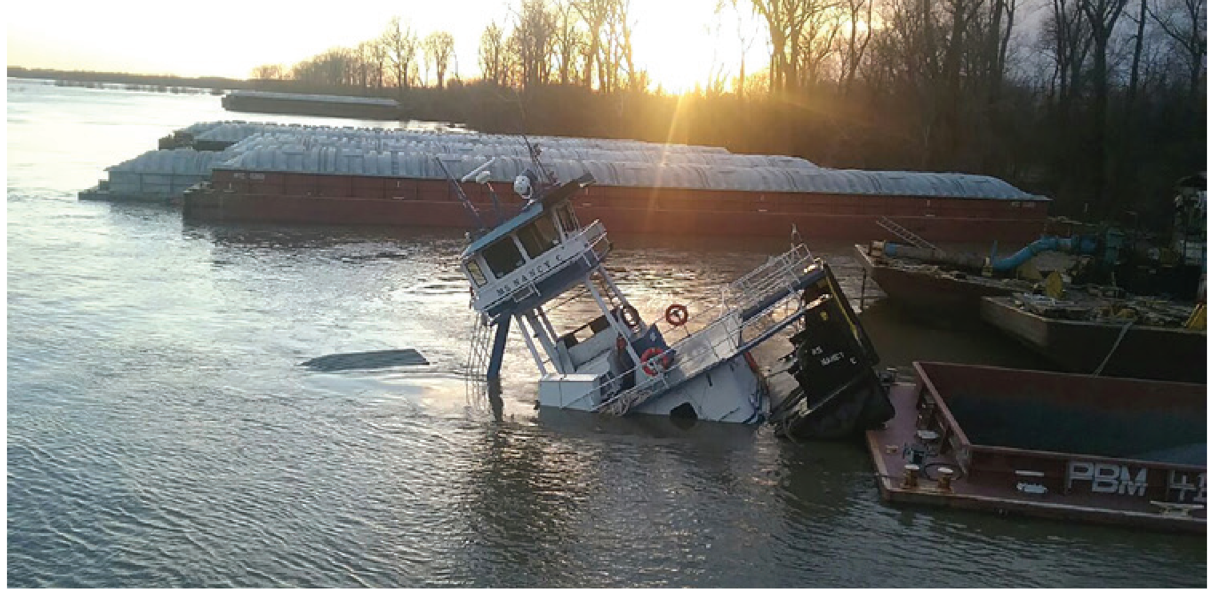


Figure 128. Postaccident photo of *Ms Nancy C*.

On March 6, 2018, about 1630 local time, the uninspected towing vessel ***Ms Nancy C*** was moving and positioning cargo barges while operating in Everett Lake, a tributary of the Mississippi River, when a deckhand discovered water in a void at the stern of the vessel. While the captain and deckhand attempted to dewater the vessel, it sank in 15 feet of water. Both crewmembers disembarked to a barge prior to the sinking without injury. Damage was estimated at $667,306.

About 0600 on March 6, the crew, consisting of a captain and deckhand, started operating the vessel and tending barges in Everett Lake. The deckhand checked the vessel prior to getting under way and found the decks, spaces, and voids to be in "acceptable condition." The winds were reported to be gusting up to 34 mph from the west, and waves were reported to be 3–4 feet with whitecaps.

About 1600 the ***Ms Nancy C*** was faced up to a barge. The deckhand observed water coming over the starboard side of the vessel; he opened a small starboard-side access cover for the aft stern void and found the void three-quarters full of water. He placed a submersible electric pump into the void to remove the water. After checking the two-propulsion shaft stern tubes, he returned to the bow of the towing vessel and saw that the condition of the vessel was getting worse. He assumed that the pump was unable to keep up with the water entering the void and retrieved a second electric submersible pump. He opened a manhole cover that accessed the aft stern void and placed the pump into the void and started it, noting that the space was full of water.

The deckhand notified the captain, who went to the stern and observed that the vessel was taking on water, its freeboard was decreasing, and its initial starboard list was increasing. The crew departed the towing vessel and went to a nearby work barge to retrieve a pump with a larger suction hose, but before they could return, the vessel heeled over to port. Shortly thereafter, the vessel sank by the stern, with the bow remaining connected to the barge with facewires. The crew contacted the company's office, and a boat was sent to remove them from the barge.

The vessel was refloated 5 days later, on March 11. Watermarks along the hull and the greater number of deck-drain holes located on the starboard stern bulwark indicated that the vessel typically operated with a slight list to starboard. On the main deck, in addition to the two access covers that were opened just prior to the sinking, a third access cover to the aft voids was found open. Other covers were missing the designed number of securing screws, and gasket material was scarred or hardened, preventing it from effectively creating a seal. Furthermore, silicone sealant was used around the covers in an apparent attempt to provide a seal. All of these factors suggest that the covers could not effectively be made watertight.

In the engine room, cofferdams fitted with pumps under the shafts had been installed, indicating that the shaft seals were typically leaking. Although the cofferdams would have contained the water to a confined area in the engine room, a hose carrying the discharge water from the port pump was leaking as it passed through the forward stern void. Around the discharge hose, sealant had been poorly applied, providing an additional source of water ingress into the forward stern void.

Along the engine room door sills, poorly installed doubler plates designed to address wastage created another potential source of water ingress from the main deck into the hull. Two penetrations found between the forward and aft stern voids rendered the bulkhead between the spaces non-watertight. The flooding of the two stern voids would have increased stern trim and thereby decreased freeboard at the aft part of the vessel.

Waves as high as 3–4 feet with whitecaps that day likely splashed against the port and starboard sides of the vessel. Rain and water from the waves could have then entered the voids through the loose access covers or wastage at the aft portion of the deckhouse.

The amount of water entering the vessel exceeded the capability of the two portable pumps. This quantity of water increased the stern trim and decreased the aft freeboard so that water was able to freely enter the three open access covers to the stern voids, as well as through several other loose access hatches and poorly fitted doubler plates. As the vessel sank further, water would then have entered the engine room through wastage on the aft side of the deckhouse and over the sills of the open engine room doors.

The probable cause of the flooding and sinking of the towing vessel *Ms Nancy C* was inadequate maintenance of the vessel by Chocktaw Transportation Company, resulting in corrosion and the loss of watertight integrity on the main deck, which allowed uncontrolled water ingress into the vessel's stern voids.

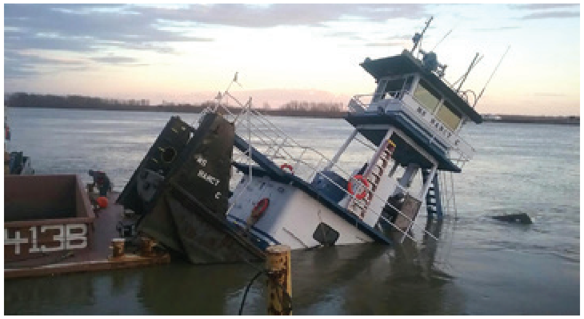


Figure 129. *Ms Nancy C* prior to salvage.

Figure 130. Starboard deck access to aft stern void found open during salvage, with broken and missing access cover screws.

Figure 131. Wastage and doubler plates as found on *Ms Nancy C* deckhouse. Top left: doubler plate over wastage below starboard engine room entrance. Top right: doubler plate over wastage below port engine room entrance. Bottom left: doubler plates over wastage on starboard aft deckhouse. Bottom right: close-up of starboard aft doubler plate showing gap between plate and wastage area.

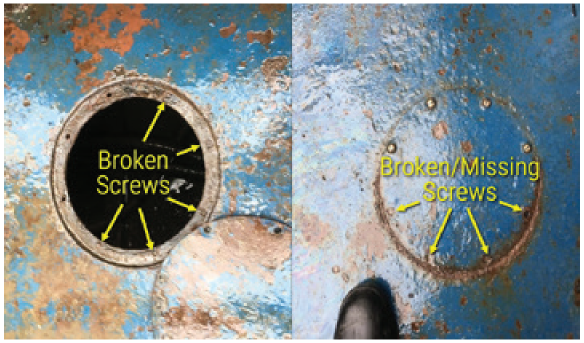


Figure 132. Starboard deck access to forward stern void found open during salvage. At right, port deck access to aft stern void, with broken and missing access cover screws.

ACCIDENT TYPE	VESSEL GROUP
FLOODING	**TOWING/BARGE**

Flooding and Sinking of Hopper Barge ***PTC 598***

LOCATION	
GULF OF MEXICO, 6 MILES SOUTHWEST OF CAPE ST. GEORGE, FLORIDA	
ACCIDENT DATE	REPORT NUMBER
NOVEMBER 4, 2018	**MAB 19/26**
ACCIDENT ID	ISSUED
DCA19FM005	**SEPTEMBER 19, 2019**

Figure 134. Barge *PTC 625* (similar to *PTC 598*) with its fiberglass cargo covers closed.
SOURCE: PARKER TOWING COMPANY

Figure 133. Towing vessel *Kaitlin Olivia*.
SOURCE: LA CARRIERS

On November 4, 2018, at 0840, the hopper barge ***PTC 598*** sank about 6 miles off Cape St. George, Florida, with a cargo of scrap metal. The barge was being towed by the towing vessel ***Kaitlin Olivia*** along with another barge, ***PTC 625***, en route from Tampa, Florida, to Mobile, Alabama. No pollution or injuries to the four crewmembers aboard the tugboat were reported. Damage was estimated to be $750,000.

Eight days before the accident on October 27, 2018, an on-charter marine surveyor inspected the two barges in Mobile. On the ***PTC 625***, two dog assembly bolts were “broken in way of the stern manhole hatch,” and one wing nut was missing on the bow manhole hatch. The surveyor stated that because of the damaged and inoperative dog assemblies, the hatches on the ***PTC 625***’s bow and stern voids would not be watertight. The surveyor reported the results to the owner/operator of towing vessel ***Kaitlin Olivia***, LA Carriers, who accepted the two empty barges.

On October 29, the vessel and tow got under way with a crew consisting of a relief master, a mate, and two deckhands, en route to Tampa, Florida, to pick up a load of scrap metal. On October 31, the tow arrived early in the morning in the Port of Tampa. Loading was completed that same afternoon, and the vessel’s permanent master reported on board and relieved the relief master. The mate supervised the securing of the weathertight cargo covers because seas of 4 feet were expected on the voyage back to Mobile. The mate noted “dogs are frozen” on the ***PTC 625*** and that the draft of each barge was 9 feet 6 inches aft. According to LA Carriers’ policy, the company should have been informed if all dogs were not in working order or if the draft of barges exceeded 9 feet. The mate informed the master of the discrepancies during the watch turnover, but neither of them informed LA Carriers. That same evening, the vessel and the barges shifted to a lay berth to wait overnight for sea conditions to improve.

The next morning, November 1, the ***Kaitlin Olivia*** got under way. Later that afternoon, the tow was reconfigured for sea with the barges strung out in a line astern. The tow departed Tampa Bay about 1900 and commenced its transit in the Gulf of Mexico toward Mobile.

Figure 135. Postaccident views of a manhole cover on the *PTC 625* is in poor condition, with missing dogs, and strapped down with line.
Source: MAB Inc and The Shear Group

About 0600 on November 4, the mate turned the vessel due west. Seas increased in wave height to about 5 feet, and the tugboat and barges began taking seas from astern. At 0700, the master began his watch, and about 0815, he noticed the *PTC 598* riding low by the stern. Approximately 15 minutes later, he changed course toward the coast to get to shallow water. About 0840, the *PTC 598* sank quickly, and the line between the barges parted. It took about 2 hours for the crew to find, recover, and attach a buoy to the line to mark the *PTC 598*'s location. The *Kaitlin Olivia* pulled into Panama City to conduct drug and alcohol testing on the crew (all results were negative) before continuing the voyage to Mobile to deliver the remaining barge. The *PTC 598* and its cargo of scrap steel were not salvaged.

The *PTC 625* lacked watertight integrity when it was surveyed in Mobile and accepted for bareboat charter and when the tow got under way on the accident voyage. The barge owner offered *PTC 625* for charter with inoperative dogs on the watertight manhole covers accessing the bow and stern voids, and LA Carriers accepted the barges despite being made aware of the issue.

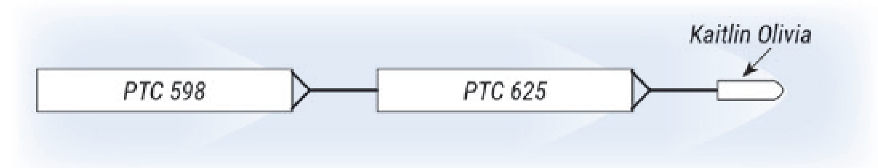


Figure 136. Tow diagram of the *Kaitlin Olivia* and the two barges on the accident voyage.

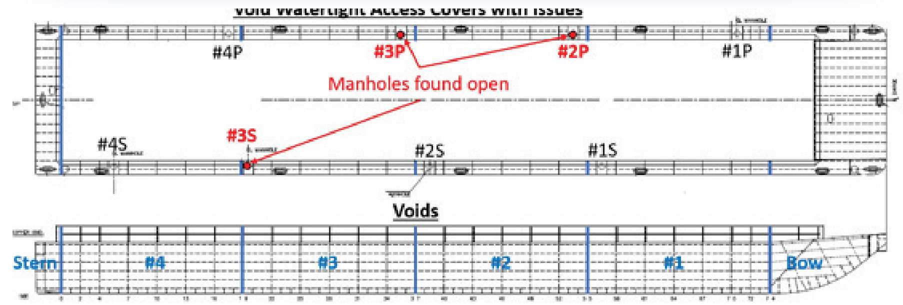


Figure 137. Drawings of *PTC 598* as viewed from above and from the starboard side. The top image shows the three manhole covers found open during the underwater survey. The bottom image shows the six void spaces.
Source: LA Carriers

LA Carriers' criterion for rough seas was 4 feet, and the expected sea state was of sufficient concern that the master delayed getting under way until the next morning to allow conditions to improve. While in the Gulf of Mexico with seas at 3–5 feet and loaded to a draft of 9 feet 6 inches—which exceeded the company's draft limit of 9 feet—the *PTC 598*'s deck was awash, as the barge had only about 2 feet 6 inches of freeboard. A postaccident dive survey on November 17 found that three of the eight manhole covers to the side voids were open, indicating that they were likely not properly secured or left open before sailing, and would therefore have allowed water ingress to both voids. As the voids filled with water, the barge's draft would have increased and its freeboard concurrently decreased, allowing boarding seas to more easily reach the lower edge of the weathertight fiberglass cargo covers and flood the barge's single cargo hold, causing the barge to sink rapidly.

The probable cause of the sinking of barge *PTC 598* was flooding of the barge's voids through improperly secured manhole covers due to the charterer's failure to ensure adherence to its procedures for barge watertight integrity and draft limits.

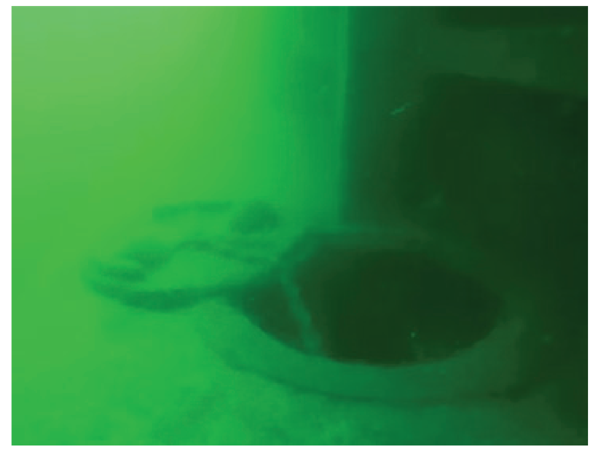


Figure 138. The open starboard manhole to void no. 3 on the *PTC 598*.

ACCIDENT TYPE	VESSEL GROUP
FLOODING	**PASSENGER**

Sinking of Amphibious Passenger Vessel ***Stretch Duck 7***

LOCATION	
TABLE ROCK LAKE, NEAR BRANSON, MISSOURI	
ACCIDENT DATE **JULY 19, 2018**	REPORT NUMBER **MAR 20/01**
ACCIDENT ID **DCA18MM028**	ISSUED **APRIL 28, 2020**

Figure 139. *Stretch Duck 7* after being recovered from Table Rock Lake following the sinking.

Figure 140. Torn canopy on the *Stretch Duck 7* during recovery at Table Rock Lake.

About 1908 on July 19, 2018, the ***Stretch Duck 7***, an original DUKW built for World War II and later modified into a commercial amphibious passenger vessel, sank during a rapidly moving storm with high winds on Table Rock Lake near Branson, Missouri. Of the 31 persons aboard during a tour of the lake, 17 fatalities resulted. Loss of the vessel was estimated at $184,000.

More than 7 hours prior to the accident, the National Weather Service had issued a severe thunderstorm watch at 1120 for western and central Missouri, including Table Rock Lake, valid until 2100 that evening. Damaging high winds up to 75 mph were forecasted, as well as large hail and a tornado or two.

The 33-foot-long ***Stretch Duck 7*** was among a fleet of vessels owned and operated by Ripley Entertainment Inc., dba Ride The Ducks Branson (Ride The Ducks). After leaving the company's boarding facility in Branson known as the "duck dock" where the tours commenced and concluded, the vessels were operated by a driver while on the roadway and a captain while on the water. Starting their tours ahead of the ***Stretch Duck 7*** on the evening of the accident were the ***Stretch Duck 27,*** the ***Stretch Duck 17***, and the ***Stretch Duck 26***, which was later replaced with the ***Stretch Duck 54*** due to a mechanical issue.

At 1827, while the ***Stretch Duck 7*** was waiting to embark on its fifth and final trip of the day, the manager-on-duty stepped onto the vessel and instructed the captain and driver to "go to the water first," which was about 6 miles away. Normally, the approximately 90-minute tour began with the typical route of touring the land nearby first and subsequently Table Rock Lake for the waterborne portion for 15 to 20 minutes, before returning to the duck dock facility.

As a total of 29 passengers began boarding the captain mentioned a storm approaching, which he said he observed while watching the weather radar earlier. He later stated in a postaccident interview, "Didn't look like it was severe."

At 1832, a minute before the ***Stretch Duck 7*** departed the facility, the National Weather Service issued a severe thunderstorm warning for an area that included Table Rock Lake. The warning, which lasted until 1930, forecasted 60 mph wind gusts.

When approaching the entry ramp for the lake, the captain gave a safety briefing for the waterborne portion of the tour, covering locations of the life rings and lifejackets, along with emergency exits through the port and starboard-side openings outboard of the passenger area. The captain then demonstrated how to properly put on and adjust a lifejacket.

At 1855, the ***Stretch Duck 7*** entered Table Rock Lake in calm water, about 2 minutes after the ***Stretch Duck 54***. Lake entry for the ***Stretch Duck 27*** occurred earlier at 1845 and for the ***Stretch Duck 17*** at 1847.

At 1859, as the wind was increasing, the ***Stretch Duck 7*** captain turned north, altering from the usual course around "Duck Island" (about 1,000 feet due west of the entry ramp). He took a more direct route toward the exit ramp, while the ***Stretch Duck 54*** was farther from shore.

About 10 minutes earlier (at 18:50:06), a passenger on board the ***Stretch Duck 27***, one of the other two vessels on the lake that were concluding their tours, had mentioned seeing lightning.

The restrictions placed on Ride The Ducks' vessels by their COI prohibited them from operating in winds of over 35 knots or in waves greater than 2 feet. In addition, the company's operations manual prohibited water entry when lightning was present or severe weather was approaching the area.

The ***Stretch Duck 27*** and the ***Stretch Duck 17*** exited the water at 19:00:10 and 19:00:36, respectively. While exiting the lake, the captain of the ***Stretch Duck 27*** observed a "dark cloud over to the west-northwest." Neither the captain on the ***Stretch Duck 27*** or the ***Stretch Duck 17*** called the duck dock facility nor the other duck boats on the lake regarding the storm.

At 19:00:15, the water surface changed rapidly, from a calm state to waves with whitecaps. Soon afterward, the captain of the ***Stretch Duck 7*** closed both port and starboard-side curtains outboard of the passenger area.

The captain on the ***Stretch Duck 54*** closed the curtains on his vessel about the same time. While south of the ***Stretch Duck 7***, he cut short the tour by also changing course and proceeding toward the exit ramp without going around Duck Island.

About 1902, the ***Stretch Duck 7*** captain remotely closed the hood on the bow engine compartment. Around this time, the vessel was approaching the stern of the paddlewheeler ***Showboat Branson Belle***, which was moored on the lake near the exit ramp.

As the ***Stretch Duck 7***'s pitching motion increased, the captain attempted to call the duck dock facility, the first of two attempts; no response was heard on the vessel's digital voyage recorder recordings.

About 1904, the bilge alarms sounded on the ***Stretch Duck 7*** and the ***Stretch Duck 54*** as the two vessels proceeded toward the exit ramp. By 1905, the ***Stretch Duck 54,*** traveling about 4 mph, had overtaken the ***Stretch Duck 7***, which was farther from shore and traveling at a speed of 1.7 mph.

Around this time, the moored ***Showboat Branson Belle*** had stopped boarding passengers for its scheduled 2000 cruise, which was ultimately cancelled, due to the high winds that had increased from 5–6 mph to over 50 mph in about 90 seconds.

Figure 141. Vessel voyages on Table Rock Lake the evening of the accident. Red line represents the calculated trackline of the *Stretch Duck 7*, and yellow line represents the actual trackline of the *Stretch Duck 54* based on GPS data.[1]

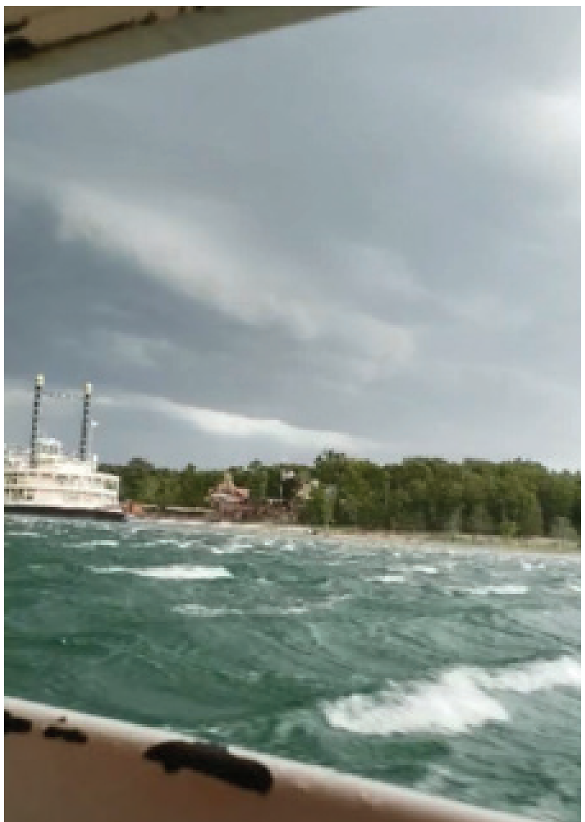
About 1907, the ***Stretch Duck 54*** had exited the water. The captain turned the ***Stretch Duck 7*** to starboard toward the exit ramp, around the stern of the showboat, which positioned the wind on the port bow of the vessel. Several passengers recalled water rising above the vessel's floorboards as well as entering from the bottom of the starboard-side curtain following the turn.

1 Tracklines were created by the NTSB in a video study report. This report and other additional information about the *Stretch Duck 7* accident investigation are available in the public docket by accessing the Docket Management System at www.ntsb.gov with the identification number DCA18MM028.

The ***Stretch Duck 7*** was listing to starboard while taking on water. One passenger described the water level rising from her feet to knees in seconds. Immediately afterward, the ***Stretch Duck 7*** sank rapidly by the stern approximately 250 feet away from the exit ramp, near the ***Showboat Branson Belle***. At some point before the vessel sank, the captain released the portside curtain and was immediately pushed out of the vessel by the water through the opened windshield.

Fourteen passengers were rescued and triaged, half of whom were transported to a local hospital. Several days later, the ***Stretch Duck 7*** was recovered from the bottom of the lake at a depth of 85 feet.

Figure 142. Below: About 1900, screenshot from passenger video shows whitecaps building on the lake seconds before the starboard-side curtain (top left) was closed on the *Stretch Duck 7*. In the background is the moored passenger vessel *Showboat Branson Belle*.



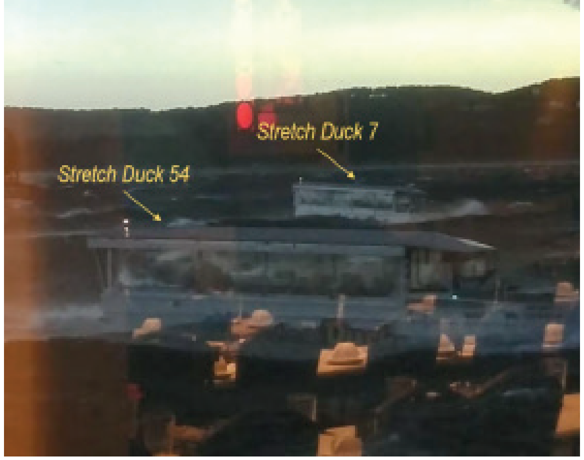


Figure 143. At 19:05:03, screenshot from video taken by a passenger inside the *Showboat Branson Belle* captures the *Stretch Duck 54* passing the *Stretch Duck 7* as they attempt to reach the exit ramp. Furnishing from the showboat's dining area is reflected in the glass.
SOURCE: JENNY CARR

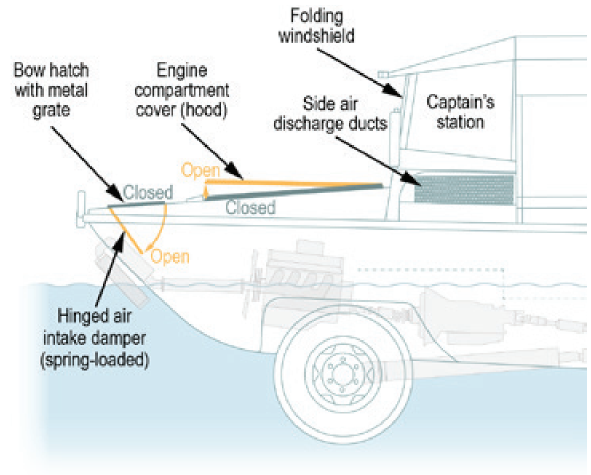
Safety issues

Company oversight. The leading edge of a storm front, later determined to be a "derecho," passed through the area generating strong winds and waves reportedly 3–5 feet high, with the highest wind gust recorded at 73 mph.

Sufficient information was available regarding the approaching storm through various means, including broadcasted severe thunderstorm watches and warnings, local media, and in-house weather software alerts. Yet, Ride The Ducks allowed four of its vessels to enter the water in close proximity to the approaching weather.

Furthermore, the restrictions on the vessels' COI prohibited them from operating in winds of over 35 knots or in waves greater than 2 feet. These restrictions were intended to prevent vessel operations during severe weather, which could be hazardous to amphibious vessels—vessels with low freeboard and subject to rapid sinking. In addition, the company's operations manual prohibited water entry when lightning was present or severe weather was approaching the area.

Engine compartment openings. As winddriven waves washed over the ***Stretch Duck 7***'s bow several times, water likely entered the vessel through the air intake hatch located on the forwardmost point of the bow. The



purpose of the hatch, when opened, was to allow air in the engine compartment for cooling the space during normal operations. Waves likely rolled over the bow hatch's spring-loaded damper and intermittently opened it, thereby allowing water into the engine compartment. As the water accumulated in the engine space, the ***Stretch Duck 7***'s bow sank lower, and as relatively higher waves rolled across the hatch, the rate of flooding would have increased.

Reserve buoyancy. The ***Stretch Duck 7*** did not have any compartmentalization or subdivision that would have contained the floodwater entering the engine compartment. As the vessel headed into the wind and waves, its pitching motion increased, allowing floodwater to travel throughout the vessel, eventually filling the passenger compartment. Without any built-in flotation or other reserve buoyancy to counter the flooding, the ***Stretch Duck 7*** started sinking. As the vessel's reserve buoyancy was overcome, its freeboard was reduced to zero.

The ***Stretch Duck 7*** likely would not have sunk, had the Coast Guard implemented the NTSB's recommendation requiring sufficient reserve buoyancy on amphibious passenger vessels through "passive means, such as watertight compartmentalization, built-in flotation, or equivalent measures" issued 17 years earlier as a result of the fatal sinking of another DUKW, the ***Miss Majestic***, which flooded progressively from a relatively small gap at the driveshaft below the waterline.

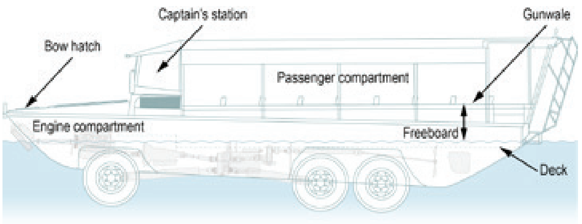


Figure 144. Profile drawing of *Stretch Duck 7* also showing engine, drive train, and propeller.

Emergency egress. Several passengers stated that the vessel's canopy obstructed their egress. The 1/32-inch-thick vinyl canopy, designed for protection against inclement weather, extended over the entire passenger compartment and the captain's station. In addition, two 1/32-inch-thick clear vinyl curtains were installed on the *Stretch Duck 7* as a protective measure, one on each side of the vessel, and controlled by a switch at the captain's station. On recovery of the vessel, investigators found the starboard-side curtain was closed and the portside curtain had been released. The NTSB had recommended that the Coast Guard require the removal of canopies for waterborne operations or installation of an approved canopy that does not restrict passenger escape following the *Miss Majestic* accident. Yet, believing its Navigation and Vessel Inspection Circular 1-01 guidance was "sufficient," the Coast Guard did not take action, which consequently may have increased the number of fatalities in the *Stretch Duck 7* accident.

The probable cause of the sinking of the amphibious passenger vessel *Stretch Duck 7* was Ripley Entertainment Inc. dba Ride The Ducks Branson's continued operation of waterborne tours after a severe thunderstorm warning was issued for Table Rock Lake, exposing the vessel to a derecho, which resulted in waves flooding through a non-weathertight air intake hatch on the bow. Contributing to the sinking was the Coast Guard's failure to require sufficient reserve buoyancy in amphibious vessels. Contributing to the loss of life was the Coast Guard's ineffective action to address emergency egress on amphibious passenger vessels with fixed canopies, such as the *Stretch Duck 7*, which impeded passenger escape.

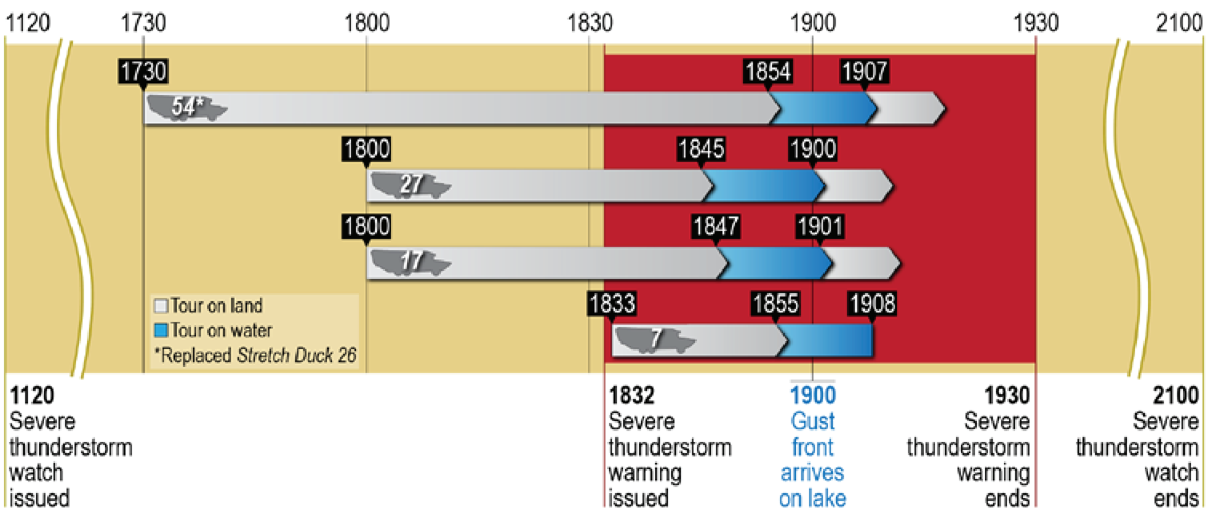


Figure 145. Timeline tracking the tours of the four duck boats while on land (gray bar) and on water (blue bar) in relation to the severe thunderstorm watch and warning issued at 1120 and 1832, respectively. Tours begin with departure from Ride the Ducks' passenger boarding facility, follow to entry in Table Rock Lake, and complete with return to the duck dock, except for the *Stretch Duck 7*.

Safety recommendation report

On November 6, 2019, prior to its final report on the investigation of the *Stretch Duck 7*, the NTSB issued early recommendations to the Coast Guard in the safety recommendation report *Improving Vessel Survivability and Passenger Emergency Egress of DUKW Amphibious Passenger Vessels*. Due the significant loss of life in this accident and the previous DUKW-related sinking of the *Miss Majestic*, the recommendations addressed the insufficient reserve buoyancy of modified DUKW vessels and their impediments, such as canopies, to passenger egress—safety issues that had been raised nearly two decades ago following the 1999 sinking of the *Miss Majestic*, which resulted in 13 fatalities.

Intended for limited military service during World War II, DUKWs were originally constructed with a low freeboard, an open hull, and no compartmentalization or subdivision, resulting in a design without adequate reserve buoyancy. Furthermore, when they were later converted for commercial use, the canopies and side curtains installed on them restricted passenger escape when the vessels sank.

Figure 146. NTSB investigator inspecting the accident vessel's bow hatch.

ACCIDENT TYPE	VESSEL GROUP
GROUNDING/STRANDING	**FISHING**

Grounding and Sinking of Fishing Vessel *Capt. M&M*

LOCATION **GULF OF MEXICO, EAST OF SABINE PASS, LOUISIANA**	
ACCIDENT DATE **SEPTEMBER 18, 2018**	REPORT NUMBER **MAB 19/25**
ACCIDENT ID **DCA18FM040**	ISSUED **SEPTEMBER 17, 2019**

Figure 147. *Capt. M&M* before the accident.
SOURCE: COAST GUARD

Figure 148. Starboard quarter of the *Capt. M&M* wreckage. Sabine Pass Jetty Channel buoys “19” (green) and “20” (red) appear in the background.
SOURCE: COAST GUARD

On September 18, 2018, at 0532 local time, the fishing vessel ***Capt. M&M*** grounded on the east jetty of Sabine Pass, an outlet for the Sabine and Neches Rivers into the Gulf of Mexico, while en route to the channel’s entrance. The vessel subsequently flooded and capsized. All four crewmembers climbed onto the overturned hull, from where they were rescued uninjured by a local law enforcement boat with Coast Guard coordination. The vessel later sank at an estimated loss of $100,000. Approximately 3,500 gallons of diesel fuel oil on board were not recovered.

About 1400 on September 17, the crew of the ***Capt. M&M***—a master and three deckhands—left Abbeville, Louisiana, to fish for shrimp. While they were trawling, fish hold refrigeration issues arose, forcing them to divert to Sabine Pass for repairs. The captain navigated until about 0300 the following morning, when he woke a deckhand to relieve him and instructed the deckhand to wake him before reaching the Sabine Pass jetties.

Small vessels approaching Sabine Pass from the east or west, instead of via the offshore fairways, must round the ends of two jetties that extend 3.5 miles offshore. The end of the east jetty is marked by the East Jetty Light, a 42-foot-high, white light flashing every 2 seconds. The light has an 8-mile nominal range.

The crew navigated with an ECS that needed to be reset about hourly for it to function correctly; otherwise, the vessel would disappear from the screen. However, the captain forgot to explain how to reset it to the deckhand, so when the ***Capt. M&M*** approached the jetties about 2 hours later, the deckhand was not aware of the vessel’s proximity to them.

About 0520 on September 18, about half an hour before sunrise, the ***Capt. M&M*** was approaching the channel from the east. Approximately 10 minutes later, the radar target on the display reached the east jetty 0.6 mile north of the jetty’s end. At 0532, the ***Capt. M&M***’s starboard bow struck the jetty. The impact from the grounding awoke the sleeping crew and caused a hole below the waterline in the forepeak, through which water began entering the vessel. The engine room also began flooding through a cutout in the collision bulkhead that separated the engine room from the forepeak.

As the vessel rolled to starboard, the crewmembers climbed up the deck, over the bulwark, and onto the hull. The captain retrieved the EPIRB and activated it. At 0552, the Coast Guard received an EPIRB distress signal identifying the vessel. An MH-65 helicopter and a 45-foot-long Response Boat–Medium were dispatched. A Jefferson County Sheriff's Office boat diverted to the scene, rescued the four crewmembers, and transferred them to the Coast Guard boat.

After capsizing, the vessel sank several days later near the site of the grounding. There was a 1.5-by-1.0-mile oil sheen afterward and none of the fuel was recovered.

Despite the malfunctioning ECS, there were several navigation aids nearby to alert the deckhand to the jetty's location. As the vessel approached the jetty, the East Jetty Light would have been visible to port, given the clear visibility. Had the vessel been on the correct course toward the channel entrance, this light would have been visible to starboard. Likewise, buoys "19" and "20," which flash green and red lights respectively every 2.5 seconds, would have been seen to starboard, in addition to a quick flashing green light on the west jetty almost directly ahead. Because the navigation aids marking the ends of the jetties and jetty channel would have been clearly visible for some time as the vessel approached, it is likely that the deckhand was not sufficiently knowledgeable in the aids to navigation without being able to reference his vessel's position on the ECS. It is also possible that the deckhand fell asleep while on watch.

Progressive flooding into the engine room occurred via a cutout in the collision bulkhead. This bulkhead had been modified with a cutout to allow crew access between the engine room and forepeak, which is common in this industry according to Coast Guard personnel. However, the modification defeated the purpose of a watertight collision bulkhead, which is to limit flooding to the forward compartment of a vessel following a collision. Once flooding reached the engine room, the vessel likely lost stability and capsized.

The probable cause of the grounding of the fishing vessel *Capt. M&M* was the failure of the wheelhouse watchstander to keep a proper navigation watch. Contributing to the sinking was a modification to the watertight collision bulkhead that allowed progressive flooding.

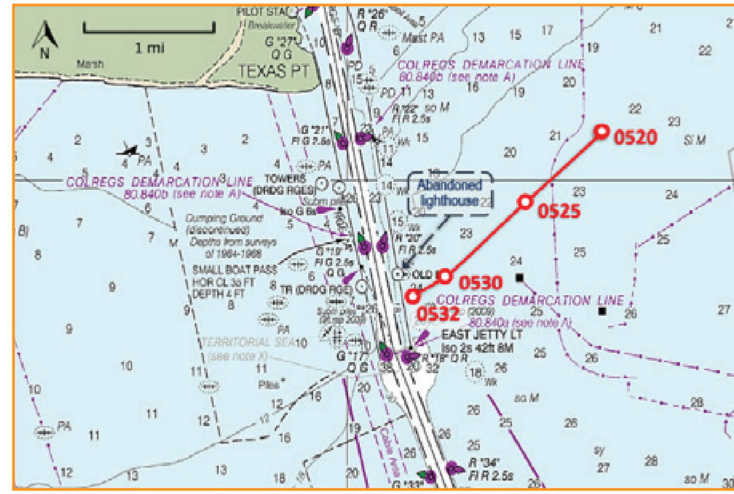


Figure 149. Trackline of the *Capt. M&M* before grounding on the jetty. SOURCE: NOAA CHART 11332

PROPER NAVIGATION

The safety of a vessel under way depends on awareness of the vessel's position and adherence to a voyage plan. Good seamanship requires correlating information from all means of navigation, including satellite, radar, and visual aids to navigation. Fishing vessel masters should ensure crewmembers navigating the vessel are familiar with electronic charting systems.

WATERTIGHT SUBDIVISION

Collision bulkheads—the first transverse watertight bulkhead aft of a vessel's stem—are designed to prevent progressive flooding when the bow is compromised in a collision. Cutting holes in these bulkheads for ease of access to adjacent spaces defeats the designed intent of the bulkhead. Vessel owners, operators, and crews should ensure the integrity of their vessels' watertight subdivision is maintained.

ACCIDENT TYPE	VESSEL GROUP
GROUNDING/STRANDING	**FISHING**

Grounding of Fishing Vessel *Imperial*

LOCATION	
GULF OF THE FARALLONES, NEAR POINT REYES, CALIFORNIA	
ACCIDENT DATE **NOVEMBER 19, 2018**	REPORT NUMBER **MAB 19/35**
ACCIDENT ID **DCA19FM008**	ISSUED **NOVEMBER 22, 2019**

On November 19, 2018, about 0445 local time, the fishing vessel ***Imperial*** was transiting the Gulf of the Farallones, 25 miles northwest of San Francisco, California. While en route to pick up a string of crab pots, the vessel grounded near Point Reyes, California. The five crewmembers remained with the vessel until they were assisted by a Coast Guard vessel. The ***Imperial*** later was towed to port. No pollution or injuries were reported. Damage to the vessel was estimated at $950,000.

The ***Imperial*** got under way at 0200 on November 14, and began to lay pots at 0600, a day ahead of the California commercial Dungeness crab fishery opening, as allowed by the regulations. At midnight, as soon as they could, the crew began hauling in the pots, emptying the crab and then baiting and setting the pots back in the water; the captain stated that it took "about 18 hours to get through the gear."

Figure 150. *Imperial* on blocks after the accident. SOURCE: COAST GUARD

Working at a rapid pace, the captain rarely found time to nap. He did not sleep at all in the first 24 hours after pulling in the first pot. He accumulated a total of 4, 6, and 10 hours of sleep in the first 48, 72, and 96 hours, respectively, before the accident.

In the early morning hours of November 19, the captain and crew finished working a line of pots 16 miles west of San Francisco and, using the automatic pilot, began sailing to the last two lines of crab pots 19 miles away, near Point Reyes, California. The crew used the time to nap, while the captain remained in the wheelhouse. The captain recalled crossing the charted traffic separation scheme south of Point Reyes and using a cell phone to talk to another fishing boat captain before he fell asleep. The bridge watch alarm was not set.

At 0445, he was awakened by the vessel shaking. He saw the cliffs of Point Reyes in front of him and rocks and white water from the breaking surf around him. The crew awakened—they found water in the engine compartment and could not stop the incoming water. With the engine still running, the captain steered the vessel further out from the surf. He shut down the engine to prevent damaging it and made a mayday call to the Coast Guard at 0508. The vessel received two portable pumps from a Good Samaritan vessel and crewmembers from a responding Coast Guard motor lifeboat assisted with continous dewatering of the engine room. The Coast Guard motor lifeboat towed the ***Imperial*** to San Francisco.

The captain's fatigue and inability to stay awake likely resulted from the lack of consecutive sleep. The intermittent sleep cycles within this timeframe would result in degraded performance, impaired judgment, and an inability to stay awake. In a fatigued state, and without the bridge watch alarm set, the captain could not safely and effectively operate the vessel, and he fell asleep. He then overran his intended stop for fishing, and the vessel continued onward and grounded. Had the captain used the alarm, this accident likely could have been prevented.

The captain indicated that it was normal to enter the derby-style Dungeness crab fishery with the intent to fish as much and as fast as possible. Although the fishery was open for more than seven months, the captain stated that most of the crabs were caught during the first week of the fishery, after which the quantity of the catch would drop quickly. Thus, there was economic pressure for the owners of vessels in this fishery, including the *Imperial*, to operate continuously at the beginning of the season to catch as much crab as quickly as possible, which led to the captain's fatigue.

The probable cause of the grounding of the fishing vessel *Imperial* was the captain's failure to monitor the vessel's track as a result of falling asleep due to an accumulated sleep deficit after 4 days of continuous operations, and the decision to not activate the vessel's installed wheelhouse watch alarm. Contributing to the accident was the vessel owner's lack of measures to mitigate crew fatigue and the nature of the derby-style Dungeness fishery in the state of California, which results in continuous fishing operations at the beginning of the season.

WATCH ALARMS

A watch alarm, if used as intended, is an effective tool that can help ensure that a crewmember remains awake and vigilant while on duty. However, a watch alarm is not a substitute for the management and mitigation of fatigue. Owners/operators of vessels equipped with a watch alarm should establish procedures for its operation and use, especially when only one crewmember is responsible for navigation and lookout.

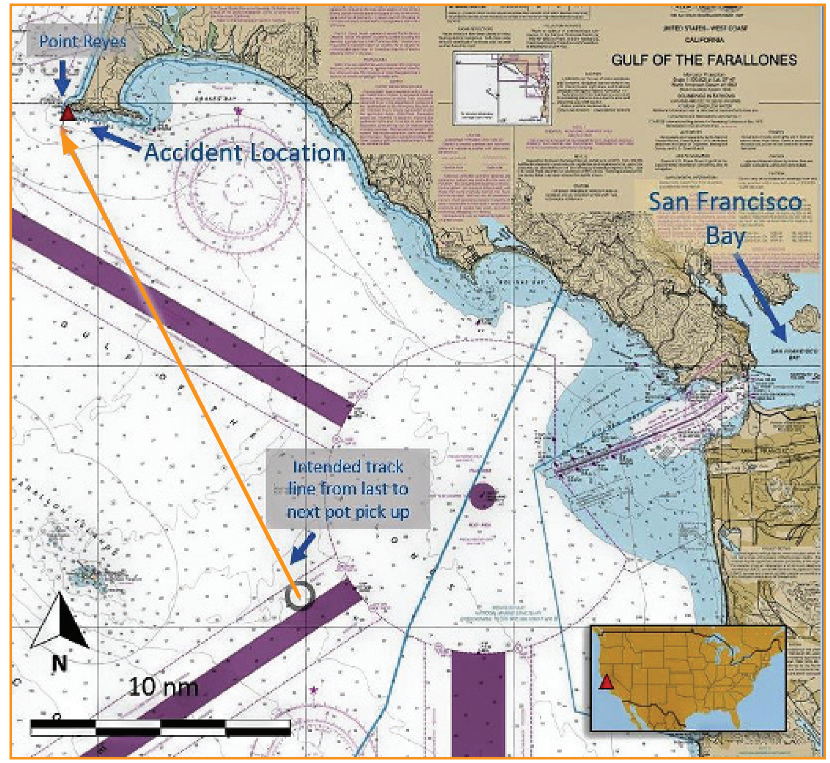


Figure 151. Intended trackline (marked in orange) for the *Imperial* from the last pot pick-up to the next pot pick-up; the orange arrowhead indicates the approximate location of the next intended pick-up. The accident location where the vessel grounded is indicated by a red triangle. Traffic separation schemes are shown on the chart (which shows the separation zone [purple shading] between the inbound and outbound lanes). Source: NOAA Chart 18645

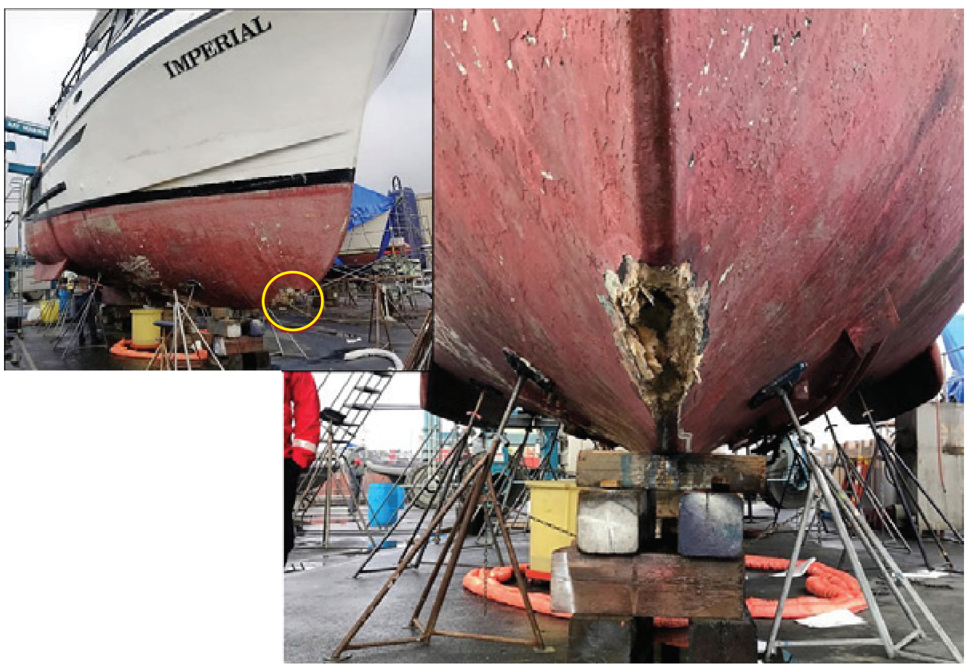


Figure 152. Left, *Imperial* bow damage. The damage is indicated with a yellow circle in the inset image.
Source: Coast Guard

ACCIDENT TYPE	VESSEL GROUP
HULL/MACHINERY/ EQUIPEMENT DAMAGE	**TOWING/BARGE**

Boom Failure aboard Crane Barge ***Atlantic Giant II***

LOCATION	
BROWNSVILLE SHIP CHANNEL, BROWNSVILLE, TEXAS	
ACCIDENT DATE **AUGUST 9, 2018**	REPORT NUMBER **MAB 19/20**
ACCIDENT ID **DCA18FM032**	ISSUED **JULY 16, 2019**

Figure 153. Collapsed crane boom on *Atlantic Giant II*. In background are *TOPS DB1* and *BOABARGE 29*.
SOURCE: COAST GUARD

On August 9, 2018, about 2030 local time, the main boom on the crane barge *Atlantic Giant II* failed while moving a section of a vessel being dismantled in the Brownsville Ship Channel in Brownsville, Texas. The load and crane boom subsequently fell into the harbor. Two shipyard employees working on the barge were injured, as well as a third on board an assisting tugboat. No pollution was reported. Damage to the barge and crane amounted to an estimated $6.4 million.

On August 9, tugboats shifted the *Atlantic Giant II* to the SteelCoast facility in the Port of Brownsville, Texas. Crews from SteelCoast, South Coast Maritime Corporation (SCM), and Keppel AmFELS then conducted a pre-job meeting for desmantling the former derrick barge *TOPS DB1*. The plan included a completed job risk analysis form that indicated the lifts would not exceed 75 percent of the crane's capacity.

By 0930, SteelCoast and Keppel AmFELS crews had rigged *Atlantic Giant II*'s main hoist to the A-frame aboard the *TOPS DB1*, which was expected to weigh 30 tons. The crane took up 30 tons of tension on the A-frame while crews cut the lift free of the *TOPS DB1*. Once free, the *Atlantic Giant II* swung the lift around and set it down on the scrapyard dock. According to the load sensor, the suspended *TOPS DB1* A-frame's final weight measured 53 tons.

Next, tugboats moved the *Atlantic Giant II* into position to lift the *TOPS DB1*'s crane counterweight, and the spuds were lowered. The counterweight was expected to weigh 350 tons. By 1500, the lift was rigged using a four-part sling, along with four 200-ton chains and 200-ton shackles for a 550-ton lift at a 60-degree boom angle. Following the lift plan, the crane took up 350 tons of tension with the main hoist while crews cut the lift free. The crane then took up 400 tons, but the lift did not move.

At 500 and 550 tons of tension, the load still did not move. SteelCoast believed that stopping the job at this time would be hazardous. At 1932, SCM's president instructed the crane operator to come up to the crane's maximum working load (700 tons).

Tugboats repositioned the *Atlantic Giant II* to boom up to a maximum weight. The operator stated that when the crane first hoisted the load, the load sensor measured about 675 tons while fully suspended at 69–70 degrees. Crewmembers overheard the crane operator on the radio stating the load was 698.1 tons at 60.7 degrees. The crane operator later indicated that the sensor was fluctuating between 650 and 700 tons.

Crews prepared to move the barge out into the channel. At this time, the *Atlantic Giant II* was trimmed by the stern. Two captains on an assisting tugboat noticed the barge's bow 1.5 feet out of the water due to the suspended weight aft and communicated this issue to the crane operator.

Two tugboats were preparing to rotate and move the *Atlantic Giant II* and the counterweight toward the dock. However, about 2030, shortly after the starboard spud was raised, the barge heeled to starboard and the crane's boom collapsed. The port stay wire failed first, dropping the load into the channel. All hands were able to evacuate to the tugboats. When the counterweight was later recovered from the water, salvors reported the lift weighed 671 tons.

A crane that is not level due to a list causes sideloading of the boom, thus reducing the rated capacity. The crane operator stated that he boomed up to 69 or 70 degrees; the Keppel AmFELS' incident report stated 68 degrees. Therefore, the vessel would have trimmed at least 7 degrees by the stern for the boom angle to read 60.7 degrees when the weight was suspended. At 60.7 degrees of boom angle, the crane's maximum capacity was 645 tons; the actual 671-ton lift exceeded the capacity by 26 tons. The trim likely contributed to the crane being overloaded by reducing the boom angle relative to the water.

The first lift made, the A-frame, was almost double the planned weight, yet work proceeded with the next much heavier lift. There were numerous opportunities for employees to stop the work. The deviation from the planned 350 tons communicated by the client was not immediately investigated to determine the source of the discrepancy. Furthermore, there was no discussion that the 75 percent of the maximum lift (525 tons) indicated on the job risk analysis form had been exceeded. Similarly, the tugboat captains' reports of *Atlantic Giant II*'s bow coming clear of the water went unanswered.

The probable cause of the boom failure aboard the crane barge *Atlantic Giant II* was the decision by South Coast Maritime and SteelCoast to continue with a lift that exceeded the planned weight without conducting additional risk assessments for the continuation of work as the crane neared its maximum capacity.

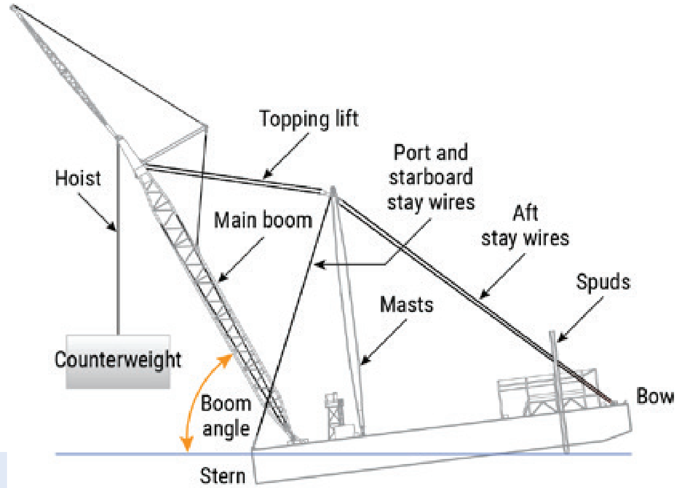


Figure 155. Simplified diagram of *Atlantic Giant II* illustrates barge's trim and boom angle relative to sea surface, as crane hoists *TOPS DB1*'s counterweight. (Dimensions and angles not drawn to scale.)

DYNAMIC RISK ASSESSMENT

Unplanned changes to work plans can move operations incrementally toward states of higher risk. Dynamic risk assessment requires that work stop when new hazards are identified, the situation is evaluated, and action is taken to control the added risks. Vessel operators should ensure crews at all levels of the organization have the authority and/or obligation to stop work when such hazards are identified.

Figure 154. Left: Derrick barge *TOPS DB1* loaded on *BOABARGE 29* during offshore salvage operations in early 2018. Yellow outline highlights counterweight lifted by *Atlantic Giant II*.
SOURCE: RESOLVE MARINE GROUP

Figure 156. *Atlantic Giant II* prior to accident.
SOURCE: SOUTH COAST MARITIME CORPORATION

ACCIDENT TYPE	VESSEL GROUP
HULL/MACHINERY/ EQUIPEMENT DAMAGE	**FISHING**

Wave Damage to Fishing Vessel ***Progress***

LOCATION	
BERING SEA, 39 NAUTICAL MILES NORTH OF UNIMAK ISLAND, ALASKA	
ACCIDENT DATE **JANUARY 26, 2018**	REPORT NUMBER **MAB 19/04**
ACCIDENT ID **DCA18FM013**	ISSUED **MARCH 20, 2019**

SOURCE: COAST GUARD

Figure 157. Wheelhouse damage and missing windows on the *Progress*.

Figure 158. *Progress* before the accident.

On January 26, 2018, at 0820 local time, the commercial fishing vessel *Progress* was riding out heavy weather in the Bering Sea north of Unimak Island, Alaska, when a large wave struck the vessel's wheelhouse. Several windows were damaged by the force of the wave, and seawater ruined navigational and other electrical equipment and knocked out the vessel's electrical power. The five crewmembers reestablished control and Good Samaritan vessels led the *Progress* back to Dutch Harbor, Alaska. The vessel sustained $1.3 million in damage. No pollution or injuries were reported.

On the afternoon of Wednesday, January 24, two days before the accident, the *Progress*, with five people on board (the captain, a first mate, two deckhands, and a NOAA observer), and the *Commodore*, both vessels fishing for the Northern Victor Fleet Cooperative, departed port and headed to the fishing grounds 95 miles northeast of Dutch Harbor. Twelve hours before departure, at 0320, the NWS issued a forecast for the area for increased winds from 30–40 knots and seas 8–16 feet between Wednesday and Friday, January 26. The *Progress* captain knew that the forecasts called for high winds and seas.

On January 25, the two boats arrived at the fishing grounds together, with the *Progress* assisting the *Commodore* in finding fish. About 1430, the *Commodore* headed toward Dutch Harbor with its half load of fish. The captain of the *Progress* noted the deteriorating weather and decided to ride it out by heading north about 40 miles, arriving about 2300 that night.

During the transit north, at 1700, the *Progress* captain obtained an updated weather forecast, which called for northnorthwest winds at 40–45 knots and seas of 18–20 feet at that time and into January 26. Based on the updated forecast, she was prepared to hove to until Saturday, January 27. Between midnight and 0100 on

January 26, the weather degraded further. At 0545, the deckhand on watch began steering north, a heading the captain maintained when she took the watch at 0700. At 0700, she observed winds of 39 to 43 knots out of the north and seas of 20 to 22 feet.

About 0820, with more than an hour remaining until sunrise, the crew woke up when a "much larger wave 30 feet to 35 feet slammed into the wheelhouse taking out six windows." The captain described the wave as "twice the size of what I had seen" and believed it was a combination of a north swell and a northwest swell she had been observing.

The wheelhouse ceiling "had been ripped off and our radios were torn away," and there was "a river of water rushing down the [wheelhouse] stairs into the galley." The crew immediately began to assess and react to the situation to secure the vessel. About 30 minutes after the wave struck the *Progress*, damage control was completed. The crew donned survival suits and then the captain, assessing that the vessel had lost all communications and navigation equipment, decided to activate the EPIRB and shoot flares, hoping vessels would respond. Shortly thereafter, one of the radios was repaired, and the captain called the Coast Guard and nearby vessels. At 0849, the Coast Guard received the EPIRB signals from the *Progress*.

The *Progress* did not encounter another large wave but made way in the heavy seas, accompanied by Good Samaritan vessels to Dutch Harbor, where the *Progress* moored at 0011 on January 27.

Larger waves like the one described by the *Progress* captain do occur but infrequently. Because wave heights vary and the NWS bases its forecast on the estimated highest one-third of the waves, mariners will experience smaller and larger waves than the significant height included in the forecast. The NWS website explained that one wave in every 1,000 waves may be twice the height of the forecast, and "there are occasional reports of 'rogue' waves of an even greater ratio." The *Progress* could have anticipated experiencing such a wave, but no one can predict when and where it could occur.

The captain of the *Progress* stated she knew she would have to sail in less than ideal conditions as was common in that area that time of year, and she opted to put to sea in forecast galeforce conditions. Although she did take precautions to relocate the *Progress* to a location where other vessels rode out the weather, the conditions further deteriorated, leaving the *Progress* vulnerable to higher wave heights at a location where seeking shelter was not an option. By virtue of her work, experience with the vessel, and operating on a rotational basis with another vessel, the captain accepted the weather risk to ensure that the *Progress* was in a position to quickly begin to fish once the weather improved.

The probable cause of the damage to fishing vessel *Progress* was an encounter with a considerably larger wave than those the vessel had been experiencing while hove to in gale-force conditions.

Forecast for	Warnings	Wind	Seas and weather
01/24/2018 Wednesday night		NW wind 25 kt before midnight… otherwise NW wind 20 kt.	Seas 8 ft. Freezing spray. Snow showers.
01/25/2018 Thursday day		NW wind 25 kt.	Seas 8 ft. Freezing spray. Snow showers.
01/25/2018 Thursday night	Gale warning Thursday night Heavy freezing spray warning Thursday night	N wind 40 kt.	Seas 15 ft.
01/26/2018 Friday		N wind 40 kt.	Seas 17 ft.
01/27/2018 Saturday		N wind 30 kt.	Seas 12 ft.
01/28/2018 Sunday		N wind 30 kt.	Seas 12 ft.

Figure 159. 1528 AKST January 24, 2018, Coastal Water Forecast up to 100 NM out between Port Haiden and Cape Sarichef.

Figure 160. Below: Interior wheelhouse damage.

Source: Coast Guard

ACCIDENT TYPE	VESSEL GROUP
HULL/MACHINERY/ EQUIPEMENT DAMAGE	**OFFSHORE SUPPLY**

Diesel Generator Failure aboard Offshore Supply Vessel *Red Dawn*

LOCATION	
NORTH PACIFIC OCEAN, 375 MILES SOUTH-SOUTHWEST OF AMCHITKA ISLAND, ALASKA	
ACCIDENT DATE **DECEMBER 13, 2017**	REPORT NUMBER **MAB 19/02**
ACCIDENT ID **DCA18FM009**	ISSUED **FEBRUARY 6, 2019**

Figure 161. *Red Dawn* under way before the accident.

About 1544 local time on December 13, 2017, the offshore supply vessel *Red Dawn* was transiting through the North Pacific Ocean en route to resupply the radar station Sea-Based XBand Radar (SBX-1). When the vessel was about 375 miles south-southwest of Amchitka Island, Alaska, its no. 2 main diesel engine suffered a mechanical failure that led to the ejection of components from the cylinder block, consequently destroying the engine. No pollution or injuries to the 12 crewmembers and 33 passengers on board were reported. The estimated damage to the *Red Dawn* totaled $957,000.

On the evening of December 9, the *Red Dawn* departed Dutch Harbor, Alaska, on a 6-day voyage to the SBX-1 platform. The captain and the chief engineer told investigators that the first 4 days were relatively uneventful and the vessel was making about 9 knots.

On the afternoon of December 13, two of the four MDGs, nos. 1 and 4, were online. At 1539, MDG no. 4 experienced a high-exhaust-temperature alarm on cylinder no. 2. After a few minutes of troubleshooting the condition, the engineers planned to start MDG no. 2 and subsequently shut down MDG no. 4 to further evaluate the alarm. MDG no. 2 started and synchronized to the electrical bus as designed. However, when shutting down MDG no. 4, the engineers received a warning alarm indicating low lube oil pressure on MDG no. 2. Shortly thereafter, another alarm sounded and MDG no. 2 shut down at 1544. Simultaneously, the engineers heard the automatic startup of MDG no. 3. In the wheelhouse, the mate and captain heard an explosion and received a smoke alarm for the port generator room, which contained MDGs nos. 1 and 2.

The chief and the assistant engineers discovered dense white haze/smoke in the port generator room but no sign of a fire. The smoke dissipated after about a minute, and they noticed lube oil on the deck plates on the outboard side of MDG no. 2. They also observed several internal fragments of MDG no. 2 lying on the deck in a puddle of lube oil on the inboard side.

The chief engineer notified the captain and continued to monitor the operating temperatures and pressures of MDGs 1 and 3. The captain made notifications ashore while the chief engineer documented the damage and photographed the area. The *Red Dawn* completed its voyage with no further incidents and returned to Dutch Harbor on the morning of December 21.

Records showed that Caterpillar technicians conducted top-end overhauls on all four MDGs during a prior shipyard period in Portland, Oregon, about 3 weeks before the accident. It was the first top-end overhaul conducted on the engines, completed in accordance with the manufacturer's maintenance warranty contract. After the overhaul, the vessel crew did not conduct any maintenance on the MDGs, nor were they required to do so.

Figure 162. Screenshot from closed-circuit television at the time of the failure, looking aft from the inboard side of MDG no. 2.

During a forensic teardown of MDG no. 2, investigators and technical experts developed an engine failure timeline. They determined that the engine was running at rated speed when the joint between cylinder no. 8's connecting rod and rod cap loosened. The connecting rod cap hinged open and detached from the crankshaft rod journal, impacting the cylinder block and causing massive damage to the engine. The connecting rods on cylinder nos. 7 and 8 disengaged from the crankshaft and collided with the rotating assembly. A series of high-energy collisions created secondary damage to the engine.

Based on the forensic teardown of MDG no. 2 and the appearance of cylinder no. 8's connection rod bolts, cap and bearing assembly, investigators determined that one of the four connecting rod bolts on cylinder no. 8 backed out of the internal thread of the connecting rod. Once this bolt backed out, the remaining three bolts became overloaded. It appeared that repetitive impact occurred as the connecting rod cap loosened, resulting in the remaining three bolts shearing off.

Figure 163. Connecting rod, cap, bolts, and bearing halves of cylinder no. 8. SOURCE: COAST GUARD

The two Caterpillar technicians who conducted the overhaul on MDG no. 2 the previous month stated that they followed company procedures and that they tightened the connecting rod bolts using a company-issued and calibrated torque wrench in accordance with the manufacturer's specifications. However, based on the findings of the circumstances pertaining to the rod assembly's failure, the bolts were likely under-torqued during the overhaul.

The probable cause of the mechanical failure on board offshore supply vessel *Red Dawn* was a connecting rod assembly on the no. 2 diesel engine that came loose and separated from the crankshaft due to improper tightening (torqueing) of the connecting rod bolts during the previous engine overhaul.

ACCIDENT TYPE	VESSEL GROUP
OTHER	**OFFSHORE SUPPLY**

Overturning of the Liftboat *Ram XVIII*

LOCATION	
GULF OF MEXICO, WEST DELTA BLOCK 68, ABOUT 15 MILES SOUTH-SOUTHEAST OF GRAND ISLE, LOUISIANA	
ACCIDENT DATE **NOVEMBER 18, 2018**	REPORT NUMBER **MAB 19/27**
ACCIDENT ID **DCA19FM007**	ISSUED **OCTOBER 17, 2019**

Figure 164. *Ram XVIII* six days after the accident, on November 24. Note the life float adrift astern of the vessel. SOURCE: COAST GUARD

Figure 165. *Ram XVIII* after the vessel was abandoned, showing a significant angle of inclination to port.

On November 18, 2018, about 0200, the liftboat *Ram XVIII* overturned in the Gulf of Mexico, in West Delta block 68, located about 15 miles south-southeast of Grand Isle, Louisiana. Five crewmembers and ten offshore workers abandoned the vessel and were rescued. Three personnel suffered minor injuries during the evacuation. An estimated 1,000 gallons of hydraulic oil were released. The vessel was declared a constructive total loss at an estimated $1,140,000.

The *Ram XVIII* got under way from Houma, Louisiana, at 0800 on Friday, November 16 to service the WD-68-U platform located in West Delta block 68, which contained documented can holes from the previous 21 years. The *Ram XVIII* was crewed by a captain, a mate, two able seamen, and an ordinary seaman at the time of the accident. Ten offshore workers were also carried on board.

On arrival, about 1030, the liftboat received permission from the platform to approach. The liftoboat had three legs: port, starboard, and aft. The plan was to place the starboard leg in a can hole, very close to where two previous vessels had jacked. The surveyor on board used sonar equipment to survey the bottom and confirmed the location of the can holes. Prior to landing on the seabed, the surveyor provided a picture of "a clean bottom with no trash" and verified the position of each leg using a satellite positioning reference system. Based on survey data, the starboard and aft legs were in cans.

The mate filled the preload tanks with 400 tons of water. The master jacked up the vessel, and the starboard and stern legs penetrated the seabed, indicating they were in the can holes as planned. The master worked for about two hours, keeping the vessel level while slowly elevating it out of the water. The mate relieved the master about 1700 and continued to "tweak" the legs until about 1930. The master then continued until 2230, when he let the ship settle. He began dumping preload tank water at

0230 on Saturday morning and stripped the tanks to prevent any free surface effect. There was a 15-foot difference between the height of the port leg and the other two legs after the preload; the vessel's owner/operator stated this was not unusual.

After a 0600 safety meeting, the mate jacked the liftboat up to a 50-foot air gap to commence work: cleaning, painting, and moving equipment by crane. About 0200 the following morning, the master was at his desk when he noticed a door swing open and the tilt alarm sound. The inclinometer read 3 degrees to port, so he started the engines and engaged hydraulic power to level the vessel. He attempted to jack the vessel to a level position but could not keep up with the increasing port list. The master notified nearby vessels on a VHF working frequency and made a mayday call on channel 16, reporting that the vessel "fell over." Coast Guard Sector New Orleans dispatched a helicopter and a small boat.

The master accounted for everyone, and the crew attempted to launch a life float but were hindered by swells. The master and the crew awaited rescue on the starboard side of the bridge. All crewmembers and offshore workers were later retrieved from the stern.

Efforts to salvage the vessel began immediately but were hampered by winter weather. Salvors completed the recovery of diesel from two integral fuel tanks by December 12. The hull was later towed further offshore and scuttled in West Delta block 96.

Survivability in foundering situations is dependent on adequate time to make a distress call and to evacuate the vessel. After the liftboat fell to port and the vessel began flooding, the master's quick VHF and mayday calls facilitated a rapid rescue.

There was no evidence to suggest a structural failure of the port leg or inadequate maintenance, design, or manufacturing of the legs or pads. Given the age of the vessel and recent maintenance periods, it is unlikely the material condition of the vessel or systems contributed to the overturning.

The master had extensive experience with liftboats, and the final positioning of the liftboat before jacking was at his discretion. Factors in the positioning included the reach of the crane and gangway to the client's platform, seafloor composition, pipelines and other obstructions, proximity to can holes, and bathymetry. The leaseholder provided high-precision Global Navigation Satellite System positioning and historical data showing locations of previous landing impressions or can holes, but did not provide core samples, past penetration depths, or historical preloading times for this block to the vessel. It is likely that the liftboat overturned because the port leg became unstable, but it is unknown whether the sea bottom washed away, the leg settled very quickly in what is known as a "punch-through," or the edge of the nearest can hole collapsed.

The probable cause of the overturning of the elevated liftboat *Ram XVIII* was the industry practice of not regularly providing liftboat operators with adequate information about the seafloor composition, which resulted in the instability of the port leg due to unidentified conditions/hazards in seabed composition near the port leg landing site.

Figure 166. The liftboat *Ram XVIII* elevated at a previous work site. SOURCE: ARIES MARINE

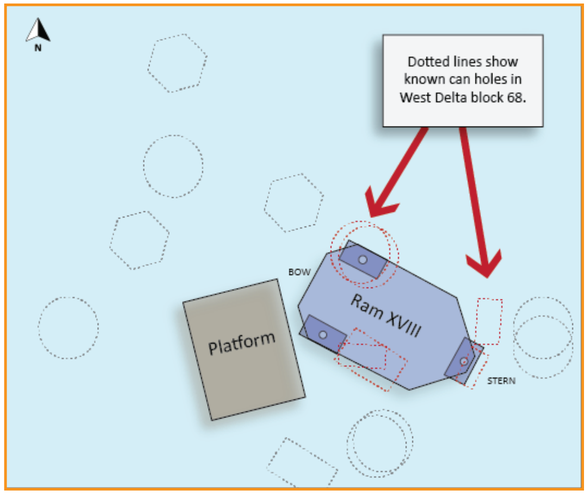


Figure 167. The WD-68-U platform and surrounding seafloor, including outlines of documented can holes. The *Ram XVIII*'s position is shown in relation to the platform, with its starboard leg in a can hole.

SEAFLOOR HAZARDS IN LIFTBOAT OPERATIONS

Seafloor conditions, including can holes; bottom changes due to storm passages; proximity to major rivers; and soil composition can pose significant hazards to safe liftboat operations. Operators should use all available information in selecting sites to land out legs. Leaseholders should provide and liftboat operators should request all necessary information for safe operations, including, but not limited to, soil analysis, penetration history for the site, and/or core samples, before commencing jack-up operations.

Lessons Learned

Some investigations closed in 2019 reminded us of accident lessons that we have unfortunately seen before. Other investigations taught us new lessons. The NTSB responds to these lessons by issuing and reiterating safety recommendations, until safety improvements become realities onboard vessels, throughout the organizations that operate them, and in the Coast Guard's regulations.

It is also critical for mariners and others in the marine industry to be able to view their own operation through the eyes of an investigator. What lesson would investigators say should have already been learned, if your vessel were in an accident?

We hope that this collection of lessons learned in the investigations closed in 2019 helps readers to take a step back and view their own operation with a cold, critical eye, then return to their day-to-day routines ready to take the appropriate action.

Organizational Oversight

Tradition holds that the captain has ultimate responsibility for a vessel and its crew. While this is largely true with respect to day-to-day operations, it does not absolve the owner, operator, or charterer of the responsibility to ensure the safety of the vessel and crew through proper maintenance of the hull and equipment, providing for a fully trained and qualified crew, and establishing and enforcing policies and procedures to identify and mitigate risk. In over one-third of all accidents reported on in 2019, insufficient organizational oversight was the primary or a contributing cause.

Insufficient organizational oversight was a factor in the *Stretch Duck 7, Buster Bouchard-B. No. 255, John S McCain–Alnic MC, Imperial, Dredge200–R.E. Pierson 2, Miss Roslyn, Jeanette, Ram XVIII, PTC 598, Atlantic Giant II, Jonathon King Boyd–Bayou Chevron, Natalie Jean*, Emsworth Locks and Dams, *Yochow–OSG Independence/OSG 243*, and *Ms Nancy C* accidents.

Fatigue

Fatigue was once again a leading primary or contributary cause in accidents in 2019. Fatigue impacts every aspect of human performance, including decision-making, reaction time, and comprehension, all of which affect seafarers' ability to safely navigate. Having fatigued operators in critical positions when navigating a busy channel or conducting other higher risk operations increases the probability of errors that lead to accidents. Companies should include fatigue management procedures in their safety management systems and ensure compliance with applicable work/rest requirements. A watch alarm, if used as intended, is an effective tool that can help ensure that a crewmember remains awake and vigilant while on duty. However, a watch alarm is not a substitute for the management and mitigation of fatigue. Owners/operators of vessels equipped with a watch alarm should establish procedures for its operation and use, especially when only one crewmember is responsible for navigation and lookout.

Fatigue was a factor in the *Aaron & Melissa II, John S McCain–Alnic MC, Shandong Fu En, Imperial*, and *Yochow/OSG Independence-OSG 243* accidents.

Master/Pilot Exchange

The master/pilot exchange is a critical component of bridge resource management and is more than a simple exchange of vessel particulars. The master/pilot exchange is an opportunity to ensure the pilot and bridge team can clearly communicate and have a shared mental model of the task ahead. A formal master/pilot exchange should be conducted whenever a pilot comes aboard a vessel, regardless of the level of familiarity with the pilot, with the master, and the vessel.

A failure to conduct a comprehensive master/pilot exchange was a factor in the *Nippon Maru* and *Carnival Horizon* accidents.

Proper Navigation

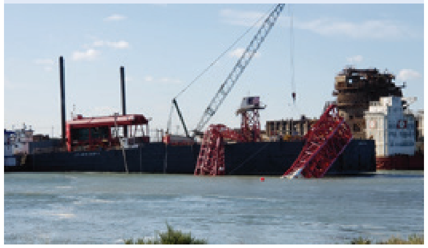
The safety of a vessel while under way depends on awareness of the vessel's position and adherence to a voyage plan. Good seamanship requires correlating information from all means of navigation, including satellite, radar, and visual aids to navigation. Crewmembers navigating the vessel should be familiar with electronic charting systems, radars, GPS and other systems.

A failure to use all means of navigation to determine a vessel's position was a factor in the *Andrew Cargill MacMillan* and *Capt. M&M* accidents.

Dynamic Risk Assessment

Owners and operators should conduct a risk assessment prior to vessel operations to determine potential hazards and mitigate dangers. Once a voyage or operation has commenced, unplanned changes to work plans can move operations incrementally toward states of higher risk. Dynamic risk assessment requires that work stop when new hazards are identified, the situation is evaluated, and action is taken to control the added risks. Vessel operators should ensure crews at all levels of the organization have the authority and/or obligation to stop work when such hazards are identified.

A failure to identify risk before commencing operations was a factor in the *Weeks 207–Seeley–Sea Jay* accident. **A lack of effective dynamic risk assessment** resulted in a failure to recognize emergent dangers in the *Stretch Duck 7*, *Atlantic Giant II*, and *Aaron & Melissa II* accidents.



Proper Lookout

Non-navigational routines should never interfere with the primary task of a watchstander or a bridge team member to maintain a proper lookout. Should performance of another task or duty be necessary, an extra lookout should be posted.

The failure to maintain a proper lookout was a factor in the *Got'M On–Lady Toni* and *Polaris–Tofteviken* accidents.

Early Communication Prior to and During Emergency Situations

Early communication can be an effective measure in averting accidents or reducing injuries and loss of life in the event of an accident. In close quarters situations, the use of VHF radio can help to dispel assumptions and provide operators with the information needed to better assess each vessel's intentions. In emergencies, rapid notification allows search and rescue authorities to respond quickly.

A lack of early VHF radio communications during a close quarters situation was a factor in the *Polaris–Tofteviken* and *John S McCain–Alnic MC* accidents. A failure to notify authorities in a timely manner delayed emergency response efforts in the *Chipolbrok Moon* accident, whereas an early distress call likely saved lives in the *Ram XVIII* accident.

Heavy Weather Conditions

Owners and operators should develop voyage plans that assess prevailing weather conditions and anticipate changes along the intended route. Regardless of requirements, planning and preparation before a voyage is critically important, including the identification of safe harbors along the route and adherence to operational limits. If unexpected weather conditions arise during a voyage, operators should consider options that minimize the risk to the crew and the vessel, including returning to port.

Inneffective planning for forecasted heavy weather conditions was a factor in the *Stretch Duck 7*, *Dredge200–R.E. Pierson 2–Big Jake*, and *Aaron & Melissa II* accidents. **Unusual wave height during heavy weather** was a factor in the *Progress* accident.

Seafloor Hazards in Undersea Operations

During undersea operations such as dredging of liftboat operations, seafloor conditions, including the presences of pipelines, cables, or can holes; bottom changes due to storm passages; proximity to major rivers; and soil composition can pose significant hazards to safe operations. Owners, operators, and charterers should use all available information for safe operations, including, but not limited to, available charts, maps, and sounding data; soil analysis, penetration history for the site, and/or core samples, before commencing operations.

Insufficiently accounting for known seafloor hazards was a factor in the *Ram XVIII* and *Jonathon King Boyd–Bayou Chevron* accidents.

Effective Hull and Structural Component Inspection & Maintenance

To protect vessels, their crews, and the environment, it is good marine practice for owners to conduct regular oversight and maintenance of hulls and structural components of a vessel, including between drydock periods. Regardless of inspection requirements, owners are obligated to ensure vessels are properly maintained, equipped, and operated in a safe condition. Issues with watertight integrity and wastage need to be addressed by permanent means.

Ineffective hull and structural component inspection and maintenance were factors in the *Aaron & Melissa II*, *Miss Roslyn*, *Buster Bouchard/B. No. 255*, and *Ms Nancy C* accidents.

Watertight Integrity and Subdivision

Maintaining watertight integrity of the hull of a vessel, to include securing hatches and doors and maintaining the material condition of hull plating, is a fundamental principal of safe operations on water. Within the hull, watertight bulkheads are designed to prevent progressive flooding when portions of the hull are compromised in a collision or other contact. Cutting holes in these bulkheads for ease of access to adjacent spaces defeats the designed intent of the bulkheads. Vessel owners, operators, and crews should ensure the integrity of their vessels' watertight subdivision is maintained.

A lack of watertight integrity and compromised or inadequate subdivision were factors in the *Stretch Duck 7, Capt. M&M, and PTC 598* accidents.

Fire Protection During Hot Work

It is critical to evaluate work areas for fire hazards to ensure that adequate protection is in place. Crewmembers involved in hot work should be trained to identify possible hazards and take action to remove or mitigate these potential risks to the vessel and crew. The fire watch should not perform any other duties while acting as fire watch and should remain on-site until the area is deemed to be safe, unless relieved by another crewmember. In addition, notifying shoreside authorities both before conducting hot work and in the event of a fire allows port authorities to properly prepare and respond more rapidly.

Inadequate fire protection during hot work was a factor in the *Jeanette* accident. Inadequate fire protection during hot work and **delayed notification to port authorities when a fire broke out** were factors in the *Chipolbrok Moon* accident.

Securing Ventilation and Openings During a Fire

When using installed firefighting systems or throwable grenade-type aerosol fire extinguishers, crewmembers should secure ventilation (fans and vent registers/louvers) and close all openings, such as engine room doors and windows, to ensure the maximum effectiveness of the extinguishing agent. When using extinguishing systems or designing any vessel space for the prevention of fires, vessel owners and operators should identify openings, provide means to ensure they can be properly secured in order to contain a fire, and train crewmembers on how to secure them during a fire emergency.

The inability or failure to secure ventilation and/or close all openings was a factor in the *Jacob Kyle Rusthoven, Rose Marie,* and *Leland Speakes* accidents. In the *Cape Cod* accident, the crew's quick response, including shutting down ventilation, helped contain a fire and limit damage.

Remote Fuel Oil and Lube Oil Cut-Off Valves

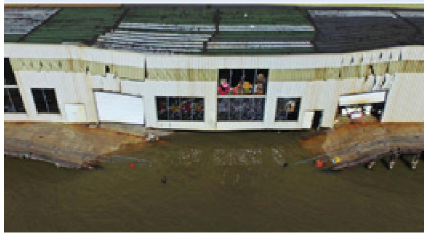
Following the initiation of an engine room fire, it is imperative to remove the source of available fuel to the fire found in the fuel oil and lube oil systems. Remote cut-off valves allow the crew to stop the flow of fuel and lube oil to a fire without having to enter an inaccessible or otherwise unsafe engine room. Vessel designers, builders, owners, and operators are encouraged to install, regularly test, and have emergency drills that incorporate remote cut-off valves for fuel and lube oil lines.

A lack of remote fuel oil and lube oil cut-off valves was a factor in the *Master D* and *Ole Betts Sea* accidents. **Remote fuel cut-off valves that were not tripped** was a factor in the *Jacob Kyle Rusthoven* accident.

Labeling of Alarms

Accurate labeling of alarms pertaining to critical machinery and essential systems is crucial so that vessel operators understand the nature of problems or failures. Quickly understanding what specific condition exists allows crewmembers and/or the operating company to take timely and appropriate action to mitigate or correct the condition.

Inaccurate labeling of an alarm was a factor in the *Steve Richoux* tow accident.



Other issues noted in briefs:

Fire/combustible materials:
Grand Sun and *Rose Marie*

Fire/loose or failed fuel/lube/ hydraulic oil lines:
Jacob Kyle Rusthoven, Master D, Hit List

Instability due to Mods:
Pacific Knight

High water/high current Ops:
Natalie Jean

Vessel Particulars

Accident Vessel	Group/Type	Flag	Length	Draft	Beam/Width	Persons on Board	Page Number
Aaron & Melissa II	Fishing vessel	United States	76.2 ft (23.22 m)	6 ft (1.8 m)	22.2 ft (6.76 m)	4	64
Alnic MC	Tanker (chemical)	Liberia	600.4 ft (183.0 m)	42.2 ft (12.9 m)	105.6 ft (32.2 m)	24	16
Altantic Giant II	Crane barge	United States	225 ft (68.6 m)	n/a	80 ft (24.4 m)	4	78
Andrew Cargill MacMillan	Towing vessel	United States	176.1 ft (53.7 m)	12.5 ft (3.8 m)	54 ft (16.5 m)	10	24
B. No 255	Barge of ATB – *Buster Bouchard*	United States	468 ft (142.6 m)	38.1 ft (11.6 m)	85.5 ft (26.1 m)	2	38
Barges (27 various)	Barge	United States	195–200 ft (59-61 m)	9 ft (2.7 m)	35 ft (10.7 m)	0	26
Bayou Chevron	Towing vessel	United States	25 ft (7.6 m)	4.5 ft (1.4 m)	14 ft (4.3 m)	0	52
Big Jake	Tugboat	United States	86.5 ft (37.8 m)	10.6 ft (3.2 m)	34 ft (10.4 m)	0	6
Buster Bouchard	Tug of ATB – *B. No 255*	United States	127 ft (38.7 m)	20 ft (6.1 m)	37 ft (11.3 m)	6	38
Cape Cod	Fishing vessel	United States	195.5 ft (59.6 m)	20 ft (6.1 m)	40 ft (12.2 m)	20	40
Capt. M&M	Fishing vessel	United States	64.6 ft (19.7 m)	n/a	20.1 ft (6.1 m)	4	74
Carnival Horizon	Cruise ship	Panama	1,062 ft (323.4 m)	27.9 ft (8.5 m)	122 ft (37.2 m)	6361	28
Chipolbrok Moon	Cargo ship	Hong Kong	655 ft (199.8 m)	50 ft (15.5 m)	91 ft (27.8 m)	24	42
Clyde S VanEnkevort	Tug of ATB – *Erie Trader*	United States	129.9 ft (39.6 m)	21 ft (6.4 m)	50 ft (10.7 m)	14	30
Dashields	Corps of Engineers workboat	United States	53 ft (10.7 m)	5 ft (1.5 m)	15 ft (4.6 m)	0	26
Dredge200	Barge (dredge)	United States	82.8 ft (13.1 m)	7.6 ft (0.9 m)	39.9 ft (4.4 m)	6	46
Emsworth	Corps of Engineers workboat	United States	39 ft (11.9 m)	5 ft (1.5 m)	14 ft (4.3 m)	0	48
Erie Trader	Barge of ATB – *Clyde S VanEnkevort*	United States	740.1 ft (225.6 m)	27 ft (8.2 m)	78 ft (23.8 m)	0	30
Got 'M On	Fishing vessel	United States	61.75 ft (18.82 m)	5.33 ft (1.63 m)	18.16 ft (6.79 m)	8	14
Grand Sun	Offshore supply vessel	United States	120 ft (36.6 m)	6 ft (1.8 m)	25 ft (7.6 m)	4	44
Hit List	Fishing vessel	United States	42 ft (12.8 m)	4.5 ft (1.4 m)	14.9 ft (4.5 m)	4	46
IB 1957	Barge	United States	200 ft (60 m)	35 ft (10.6 m)	35 ft (10.6 m)	0	10
Imperial	Fishing vessel	United States	53 ft (16.2 m)	9 ft (2.7 m)	21 ft (6.4 m)	5	76
Jacob Kyle Rusthoven	Towing vessel	United States	85.3 ft (26 m)	9 ft (2.7 m)	28.5 ft (8.7 m)	6	48
Jeanette	Fishing vessel	United States	228 ft (69.5 m)	18.2 ft (5.5 m)	43.1 ft (13.1 m)	19	50
John S McCain	Navy destroyer	United States	504.5 ft (153.8 m)	32.5 ft (9.9 m)	66.4 ft (20.2 m)	280	16
Jonathon King Boyd	Dredge (cutter suction)	United States	130 ft (39.6 m)	5 ft (1.5 m)	33 ft (10 m)	10	52
Kaitlin Olivia	Towing vessel	United States	75 ft (22.9 m)	9 ft (2.7 m)	26 ft (7.9 m)	4	68

Accident Vessel	Group/Type	Flag	Length	Draft	Beam/Width	Persons on Board	Page Number
Lady Toni	Fishing vessel	United States	79.2 ft (24.14 m)	8 ft (2.44 m)	24.01 ft (7.32 m)	4	14
Leland Speakes	Towing vessel	United States	150.2 ft (45.8 m)	9.7 ft (3 m)	44.2 ft (13.5 m)	9	54
Logger	Fish tender	United States	105 ft (32 m)	8 ft (2.4 m)	30 ft (9.1 m)	3	56
Master D	Fishing vessel	United States	68 ft (20.8 m)	12 ft (3.7 m)	22 ft (6.7 m)	3	58
Miss Roslyn	Towing vessel	United States	65 ft (19.8 m)	7 ft (2.1 m)	24 ft (7.3 m)	3	8
Ms Nancy C	Towing vessel	United States	64.5 ft (19.7 m)	6 ft (1.8 m)	23 ft (7 m)	2	66
Natalie Jean	Towing vessel	United States	64 ft (19.4 m)	7.2 ft (2.2 m)	25.9 ft (7.9 m)	3	10
Nippon Maru	Cruise ship	Japan	547.9 ft (167 m)	21 ft (6.4 m)	78.7 ft (24 m)	624	32
Ole Betts Sea	Fishing vessel	United States	67.6 ft (20.6 m)	11 ft (3.35 m)	20.3 ft (6.2 m)	3	60
OSG 243	Barge of ATB – *OSG Independence*	United States	557.3 ft (169.9 m)	31.5 ft (9.6 m)	83 ft (25.3 m)	0	22
OSG Independence	Tug of ATB – *OSG 243*	United States	131 ft (39.9 m)	16 ft (3.4 m)	37 ft (11.3 m)	8	22
Pacific Knight	Fish tender	United States	58 ft (17.7m)	9 ft (2.7 m)	20.7 ft (6.3 m)	3	12
Polaris	Fishing vessel	United States	90.5 ft (27.6 m)	14.5 ft (4.4 m)	28.0 ft (8.5 m)	7	18
Progress	Fishing vessel	United States	112.6 ft (34.3 m)	14.04 ft (4.28 m)	30.1 ft (9.2 m)	5	80
PTC 598	Barge (hopper)	United States	200 ft (61 m)	9.5 ft (2.9 m)	35 ft (10.7 m)	0	68
Ram XVIII	Liftboat	United States	128.6 ft (39 m)	7.5 ft (2.4 m)	78 ft (27.8 m)	15	84
Red Dawn	Offshore supply vessel	United States	292 ft (89 m)	19.9 ft (6.1 m)	64 ft (19.5 m)	45	82
Rose Marie	Fishing vessel	United States	87 ft (26.5 m)	9.5 ft (2.9 m)	24 ft (7.3 m)	4	62
Sea Jay	Sailboat	United States	50 ft (15.2 m)	4 ft (1.2 m)	26 ft (7.9 m)	0	20
Seeley	Tugboat	United States	77 ft (23.5 m)	10 ft (3 m)	26 ft (7.9 m)	5	20
Shandong Fu En	Bulk carrier	Hong Kong	751.3 ft (229 m)	44 ft (13.4 m)	105 ft (32 m)	20	34
Steve Richoux	Towing vessel	United States	85 ft (25.9 m)	11 ft (3.4 m)	30 ft (9.14 m)	5	36
Stretch Duck 07	Amphibious passenger vessel	United States	33 ft (10.1 m)	5.2 ft (1.6 m)	8 ft (2.4 m)	31	70
Tofteviken	Tanker (oil)	Bahamas	819.9 ft (249.9 m)	26.3 ft (8 m)	143.7 ft (43.8 m)	25	18
Weeks 207	Barge (sand)	United States	150 ft (45.7 m)	8 ft (2.4 m)	40 ft (12.2 m)	0	20
Yochow	Bulk carrier	Hong Kong	590 ft (180 m)	32.2 ft (9.8 m)	98 ft (30 m)	18	22

Table & Map *of* Accident Locations

VESSEL TYPES INCLUDED IN THIS DIGEST

CARGO
- Bulk carrier
- Cargo ship

FISHING
- Fish tender
- Fishing vessel

GOVERNMENT
- Corps of Engineers workboat
- Navy destroyer

OFFSHORE SUPPLY
- Offshore supply vessel
- Liftboat

PASSENGER
- Amphibious passenger vessel
- Cruise ship

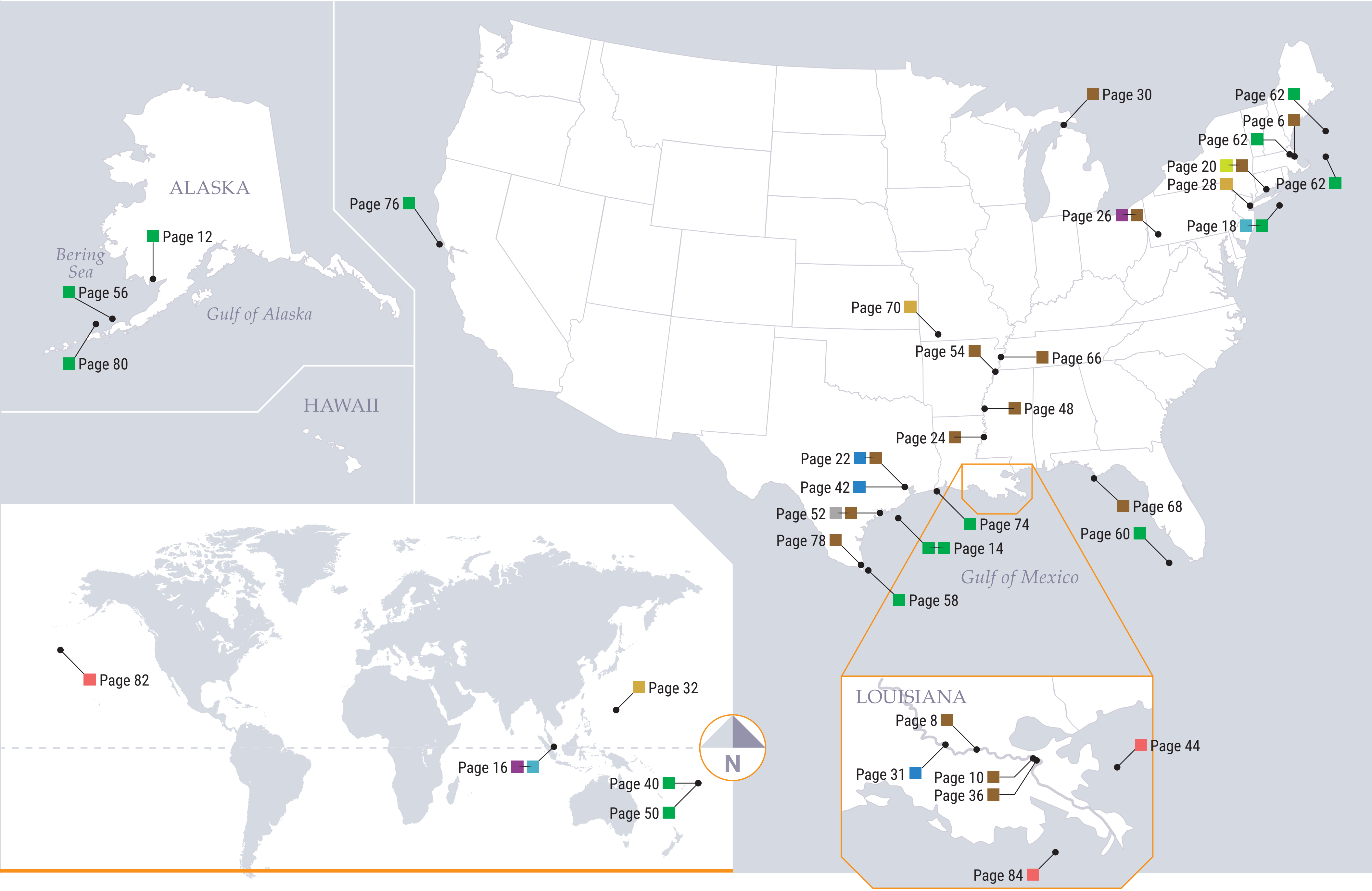
RECREATIONAL
- Sailboat

TANKER
- Tanker (chemical)
- Tanker (oil)

TOWING/BARGE
- Articulated tug and barge (ATBs)
- Barge
- Towing vessel
- Tugboat

OTHER
- Dredge
- Workboat

VESSEL GROUP KEY: CARGO FISHING GOVERNMENT OFFSHORE SUPPLY PASSENGER RECREATIONAL TANKER TOWING/BARGE OTHER



Acknowledgments

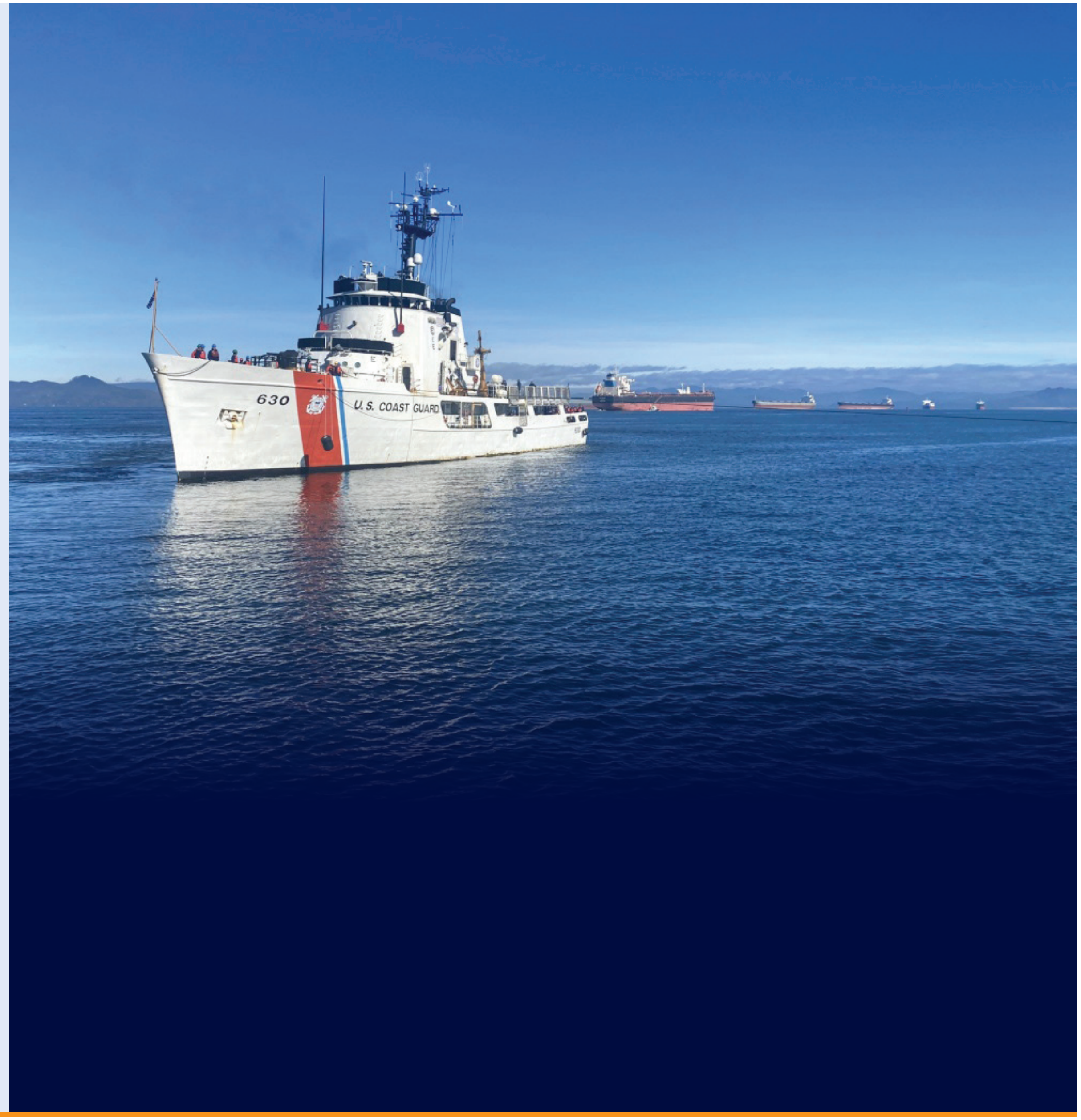
For each marine accident the NTSB investigated, investigators from the Office of Marine Safety worked closely with the Coast Guard Office of Investigations and Casualty Analysis in Washington, DC, and with the following Coast Guard units:

ACCIDENT VESSEL	COAST GUARD UNIT
Aaron & Melissa II	Coast Guard Sector Northern New England
Altantic Giant II	Coast Guard Marine Safety Detachment Brownsville/Occupational Safety & Health Administration Corpus Christi Area Office
Andrew Cargill MacMillan	Coast Guard Marine Safety Detachment Vicksburg, Mississippi
Barges (27 various) • *Emsworth* • *Dashields*	Coast Guard Marine Safety Unit Pittsburgh
Big Jake • *Dredge200* • *R.E. Pierson 2*	Coast Guard Sector Boston
Buster Bouchard/B. No 255	Coast Guard Sector Corpus Christi, Texas
Cape Cod	Coast Guard Marine Safety Detachment American Samoa/Coast Guard Sector Honolulu
Capt. M&M	Coast Guard Marine Safety Unit Port Arthur, Texas
Carnival Horizon	Coast Guard Sector New York
Chipolbrok Moon	Coast Guard Houston/Galveston
Clyde S VanEnkevort/Erie Trader	Coast Guard Sector Salt Sainte Marie
Got 'M On • *Lady Toni*	Coast Guard Marine Safety Detachment Victoria, Texas
Grand Sun	Coast Guard Sector New Orleans
Hit List	Coast Guard Sector Boston
Imperial	Coast Guard Sector San Francisco
Jacob Kyle Rusthoven	Coast Guard Sector Lower Mississippi River
Jeanette	Coast Guard Marine Safety Detachment American Samoa
John S McCain • *Alnic MC*	Coast Guard Activities Far East (FEACT)
Jonathon King Boyd • *Bayou Chevron*	Coast Guard Marine Safety Detachment Victoria
Kaitlin Olivia • *PTC 598*	Coast Guard Marine Safety Detachment Panama City
Leland Speakes	Coast Guard Marine Safety Detachment Vicksburg
Logger	Coast Guard Sector Anchorage
Master D	Coast Guard Marine Safety Detachment Brownsville
Miss Roslyn	Coast Guard Sector New Orleans
Ms Nancy C	Coast Guard Sector Lower Mississippi River
Natalie Jean • *IB 1957*	Coast Guard Sector New Orleans
Nippon Maru	Coast Guard Sector Guam
Ole Betts Sea	Coast Guard Sector Key West
Pacific Knight	Coast Guard Sector Anchorage
Polaris • *Tofteviken*	Coast Guard Sectors New York and Southeastern New England
Progress	Coast Guard Sector Anchorage
Ram XVIII	Coast Guard Marine Safety Unit Houma
Red Dawn	Coast Guard Sector Anchorage/Coast Guard Marine Safety Detachment Dutch Harbor
Rose Marie	Coast Guard Sector Southeastern New England
Seeley • *Sea Jay* • *Weeks 207*	Coast Guard Sector Long Island Sound, Connecticut
Shandong Fu En	Coast Guard Sector New Orleans
Steve Richoux	Coast Guard Sector New Orleans
Stretch Duck 07	Coast Guard Sector Upper Mississippi River
Yochow • *OSG Independence/OSG 243*	Coast Guard Sector Houston/Galveston

Who Has *the* Lead: USCG *or* NTSB?

In a memorandum of understanding (MOU) signed December 18, 2008, the NTSB and the US Coast Guard agreed that when both agencies investigate a marine casualty, one agency will serve as the lead federal agency for the investigation. The NTSB Chairman and the Coast Guard Commandant, or their designees, will determine which agency will lead the investigation.

The NTSB may lead the investigation of “significant marine casualties,” defined in the MOU as a loss of three or more lives on a commercial passenger vessel; loss of life or serious injury to 12 or more persons on any commercial vessel; loss of a mechanically propelled commercial vessel of 1,600 or more gross tons; loss of life involving a highway, bridge, railroad, or other shore side structure; serious threat, as determined by the NTSB Chairman and the Coast Guard Commandant, or their designees, to life, property, or the environment by hazardous materials; and significant safety issues, as determined by the NTSB Chairman and the Coast Guard Commandant, or their designees, relating to Coast Guard marine safety functions.



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Office *of* Marine Safety

The NTSB Office of Marine Safety (MS) investigates major marine casualties on or under the territorial waters of the United States, including accidents involving US-flagged merchant vessels worldwide and those involving both US public and nonpublic vessels in the same casualty. In addition, the office investigates selected catastrophic marine accidents and those of a recurring nature.

The Coast Guard conducts preliminary investigations of all marine accidents and notifies the NTSB if an accident qualifies as a major marine casualty, which is defined as resulting in at least one of the following:

- The loss of six or more lives.
- The loss of a mechanically propelled vessel of 100 or more gross tons.
- Property damage initially estimated at $500,000 or more.
- Serious threat (as determined by the Coast Guard Commandant and concurred with by the NTSB Chairman) to life, property, or the environment from hazardous materials.

MS investigates and determines the probable cause of all major marine casualties. For select major marine casualties, the office launches a full investigative team and presents the investigative product to the Board. In all other major marine casualties, MS launches marine investigators to the scene to gather sufficient factual information to develop a marine accident brief report. Most of these brief investigation reports are adopted by the MS director through delegated authority; the remainder, including reports on accidents involving public and nonpublic marine casualties, are adopted by the Board.

International Program

The international program involves reviewing US Administration position papers related to marine accident investigations and participating in select International Maritime Organization (IMO) meetings. In 2019, the NTSB attended IMO meetings about reviewing and classifying maritime accidents and accident reporting, mariner certification and training, and voyage data recorder technical standards and requirements.

Under the MS international program, the NTSB also coordinates with other US and foreign agencies to ensure consistency with IMO conventions, most notably in joint US flag state marine accident investigations. We also cooperate with other accident investigation organizations worldwide, such as the Marine Accident Investigators' International Forum, and track developments in marine accident investigation and prevention.


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OPELLER


NTSB

"With every investigation we learn new safety lessons to prevent or mitigate future losses—but only when marine stakeholders at all levels of the industry apply these lessons."

Robert Sumwalt, NTSB Chairman

NATIONAL TRANSPORTATION SAFETY BOARD

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