



National Transportation Safety Board

Marine Accident Brief

Flooding and Sinking of Towing Vessel *Mangilao* Towed by *Chamorro*

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|-----------------------------|--|-----------------------|
| Accident type | Flooding | No. DCA19FM045 |
| Vessel name | <i>Mangilao</i> | |
| Location | Pacific Ocean, 800 miles northwest of Guam 15°50.0' N, 131°14.5' E | |
| Date | August 05, 2019 | |
| Time | 0439 local time (coordinated universal time –10 hours) | |
| Injuries | None | |
| Property damage | \$437,227 | |
| Environmental damage | None | |
| Weather | Heavy rain and cloud cover with minimal visibility; winds 30–40 knots and wave heights approximately 15 feet | |
| Waterway information | Pacific Ocean, 800 miles northwest of Guam. | |

On August 05, 2019, about 0439 local time, the towing vessel *Mangilao* was under tow by the towing vessel *Chamorro*, about 800 miles northwest of Guam in the Pacific Ocean, en route to a drydock in Subic Bay, Philippines, in a developing storm.¹ The towline to the unmanned *Mangilao* parted, and the vessels separated. The *Chamorro* retraced its route and found the *Mangilao* taking on water, and the *Mangilao* eventually sank. The *Chamorro* continued to the Philippines with its crew of 10. No pollution or injuries were reported. The *Mangilao* was lost, with an estimated value of \$437,227.



Mangilao (on left) and *Chamorro* (on right) under way prior to the accident voyage. (Source: Cabras Marine Corporation)

¹ All miles in this report are nautical miles (1.15 statute miles).

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Area of accident where *Mangilao* sank, as indicated by the red triangle. (Background source: Google Maps)

Background

The US-flagged *Mangilao* was a tugboat built in 1982 by Sagami Shipbuilding Company Limited of Yokosuka, Japan. The vessel had a current load line certificate, a length of 114 feet, and a draft of 13 feet (observed draft at the time of departure was 6.7 feet forward and 9 feet aft). The vessel was being towed to a drydock facility in Subic Bay, Philippines, so that new watertight doors and other equipment could be installed. The *Mangilao* was carrying the equipment that was to be installed.

The US-flagged *Chamorro* was a 96.8-foot-long, twin-screw tugboat rated at 1,700 horsepower and built in 1974 by Halter Marine Services Incorporated of New Orleans, Louisiana.

Both vessels were owned and operated by Cabras Marine Corporation, a provider of pilot, tug, barge, spill-response, firefighting, and ferry services in Guam and the Commonwealth of the Northern Mariana Islands.

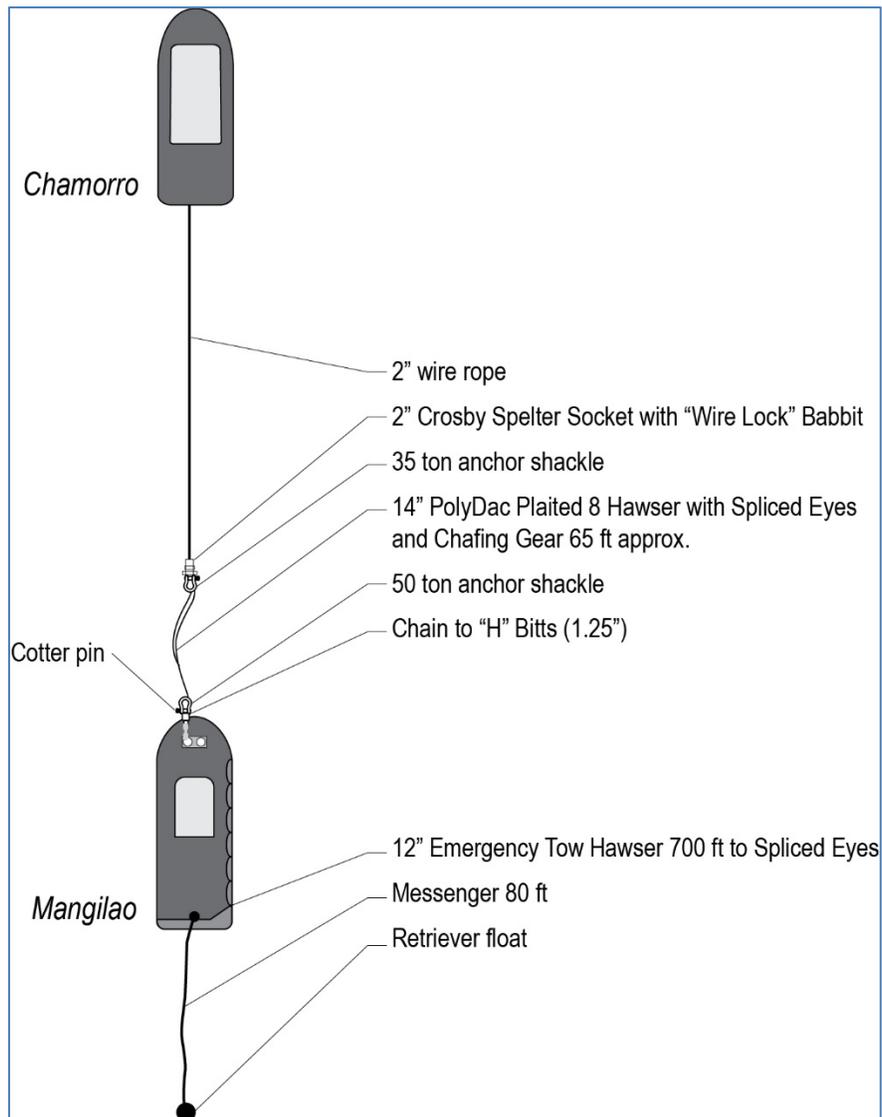
Accident Events

About 1400 on July 29, 2019, following a Dead Ship Movement (DSM) towing inspection by the US Coast Guard, the *Chamorro*, with the *Mangilao* in tow, departed Apra Harbor, Guam, en route to Subic Bay (about 1,517 miles) with a crew of 10. No one was aboard the *Mangilao*.

The *Mangilao* was towed astern of the *Chamorro* on a 2-inch wire rope with approximately 1,000 feet extended; a 14-inch-diameter-by-60-foot PolyDac plaited 8-strand hawser; a 1.25-inch chain terminal; and two anchor-type shackles connecting each part—one 35-ton shackle closest to the *Chamorro* and one 50-ton shackle to the 1.25-inch chain closest to the *Mangilao*. The 50-ton shackle had a bolt-type shackle pin fitted through smooth bore ears, and, as described by the tow captain, “we put a pin of the correct size in. We bent it over a significant amount so it couldn’t fall out.” The captain indicated the shackle had one-quarter-inch nylon rope around it for “cushion,”

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as there was no thimble (on the 14-inch hawser) connected to the shackle bow. He recalled that the chain went through the *Mangilao*'s foredeck closed-bitt chock and was about 6 feet long, placing the shackle above the *Mangilao*'s bow fender. He stated that under tow, the shackle had a horizontal orientation and was about 8–12 inches above the fender. While under tow, the *Mangilao* displayed port, starboard, and stern running lights. The original navigation lights had been replaced with solar electric-eye LED lights, which turned on when dark.



Representation of tow plan based on interview with *Chamorro* captain.

The tow's estimated arrival in the Philippines was August 8. A tropical storm, which eventually became Typhoon Lekima, was developing prior to the crew's departure. Aware that the impending storm was expected to be along the vessel's intended route, the captain used a weather-

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routing service, StormGeo (formerly Applied Weather Technology), to monitor the weather and obtain routing recommendations during the voyage.²

On the morning of July 30, while the *Chamorro* was on a westward course of 267 degrees, the crew logged winds of 7–12 knots from the south-southwest and swells about 3 feet. As the tugboat and tow progressed along its route at a speed of about 6.5 knots, they encountered rain showers and increasing winds. The crew noted around noon that the *Mangilao* was “riding well.”

On July 31, just after midnight, the *Chamorro* crew began to encounter rough seas, and by about 0400, they reported squalls with steady winds from the west estimated to be 11–16 knots. The vessel’s speed decreased to 5.5 knots, and by 0800, the crew had updated their arrival in Subic Bay to be August 9, one day later than originally planned.

On August 1, at 1048, the captain decided, in accordance with StormGeo recommendations, to change course farther to the northwest (301 degrees) to avoid heavy weather. The crew was experiencing winds from the southwest at 17–21 knots, seas about 5 feet, and isolated showers. About 2000, the winds had dropped, and the sea swells were west-southwest about 3 feet. At 2151, the crew logged that the chafing gear and tow wire were inspected and found “all in good order.”

Around noon on August 2, with a southerly wind blowing around 20–30 knots, the captain altered course to 311 degrees to avoid the developing tropical storm, as advised by the weather-routing service. The crew checked the *Mangilao* and the towing gear on several occasions over the course of the day and recorded the gear as being “in good order” each time. By 2000, the winds were south-southwest and had decreased to around 8–10 knots, and the rain had subsided. The next morning, around 0800, they changed course to back to the west (270 degrees), still reportedly progressing at a speed of about 5.5 knots. According to the logbook, at noon, winds were again increasing, seas were about 3 feet, and the *Mangilao* was “riding well.” No significant events were reported or recalled for the remainder of the day.

The Joint Typhoon Warning Center’s first mention of the potential tropical cyclone development for the accident region occurred at 2200 local time on August 3, 2019. The remarks indicated that a significant tropical cyclone was possible within 160 miles “either side of a line from 15.3N 132.0E TO 19.6N 135.6E within the next 12 to 24 hours...winds in the area are estimated to be 20-25 [knots]...the potential for the development of a significant tropical cyclone within the next 24 hours is high.”

On August 4, StormGeo sent out a special report indicating a tropical cyclone formation alert. The captain stated, “I had actually asked them prior to going north about a 1004 millibar [mb] low that was...advertised on JMA’s [Japan Meteorological Agency] weather chart services analysis, I think that was the first that 1004 [mb] low was sitting at 17 North and 135 East.” He believed that the tow would transit south of the low-pressure system, but the system moved south and became Typhoon Lekima, developing “right over” the tow. Winds were coming from the southwest, and the captain estimated the waves to be about 10–13 feet. He stated that he set the parameters for StormGeo to lessen the impact of the sea conditions and give them “a bigger sea on the stern.” However, he said he was still getting about 10-foot waves on the stern. Although

² Applied Weather Technology weather-routing service was acquired by StormGeo in 2014. The *Chamorro* captain used these terms interchangeably; however, all references in this report have been changed to StormGeo.

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they were in bigger waves than he had anticipated, he explained that they were beyond the halfway point, and, even if the tow turned back toward Guam, it would still have to endure significant weather, so he did not want to turn back.

At 0845, with winds from the southwest, the captain reduced the *Chamorro*'s engine speed from 5.3 knots to 3.2 knots and altered course from 270 degrees to 248 degrees. At 0905, he called all hands to the wheelhouse for a safety briefing. He directed the crew to extend the tow wire to about 1,400 feet, explaining that they were expecting to encounter some significant weather and that this would provide a smoother ride. About 15 minutes later, once the tow wire was extended, he ordered all crew off deck. Throughout the remainder of the day, they encountered significant winds from the southwest (rated as "8" on the Beaufort scale, with speeds of 39–46 knots) and reported that the tug *Mangilao* was rolling and pitching with seas about 12 feet. By about 2000, the crew encountered seas reported at 13 feet, with winds from the west, and visibility was poor.

The chief mate relieved the captain for the 0000–0400 watch on August 5. The vessel log indicated that at 0001, with winds from the west-southwest, the vessel speed was 2.6 knots. The captain had called StormGeo at 0006, just before being relieved, and directed the chief mate to change course to 245 degrees per StormGeo's recommendation, heading toward the San Bernardino Strait. Around 0200, the chief mate checked the *Mangilao* and noticed it was still rolling and pitching due to the "very rough sea." Winds continued from the south-southwest at 39–46 knots, the vessel speed was 2.8 knots, and there were heavy rains and seas about 10 feet. The assistant engineer on watch during the 0000–0400 watch stated that he remembered seeing the tow at some point on his watch, but he could not recall the time. He described the seas as "active," saying that the winds and seas would sometimes be "directly behind us, sometimes it would be to port, sometimes to starboard," which he did not consider unusual, given the weather.

Although not recorded in the vessel log, the chief mate stated that, around 0340, he completed a final visual check of the tow just before the second mate relieved him. He reported that he could see the navigation lights on the *Mangilao*. The second mate was scheduled to stand watch from 0400 to 0800 that morning. He stated that, at 0400, very heavy rain and storm conditions persisted, which prevented him from being able to see the *Mangilao* or its running lights. About 20 minutes later, the rain passed, and he still could not see the running lights. About 0430, the second mate awakened the chief mate and asked for his assistance in looking for the tow. The chief mate recalled asking the able-bodied seaman on watch for the vessel's speed, which was about 5.5 knots. The chief mate said that, at that point, he knew they had lost the tow, as the speed prior to his being relieved was only about 2 knots. The second mate checked for radar returns and, seeing nothing, he called the captain to inform him of the situation.

At 0440, the captain called the crew on deck to retrieve and secure the tow wire. The crew turned the vessel downwind to a course of 010 degrees. Due to seas washing over the deck and the inherent safety hazards associated with working on deck during the weather, it took the crew about 50 minutes to recover the tow wire. The wire and the 14-inch tow pendant came aboard, but the crew noticed the shackle closest to the *Mangilao* was missing its pin. The crew worked to get the wire on the tow winch, and all equipment was secured on the deck by 0530.

The captain commenced the search for the *Mangilao*. Weather conditions were overcast with rain squalls, and he estimated visibility at less than one-quarter mile. The second mate described the weather as "rough."

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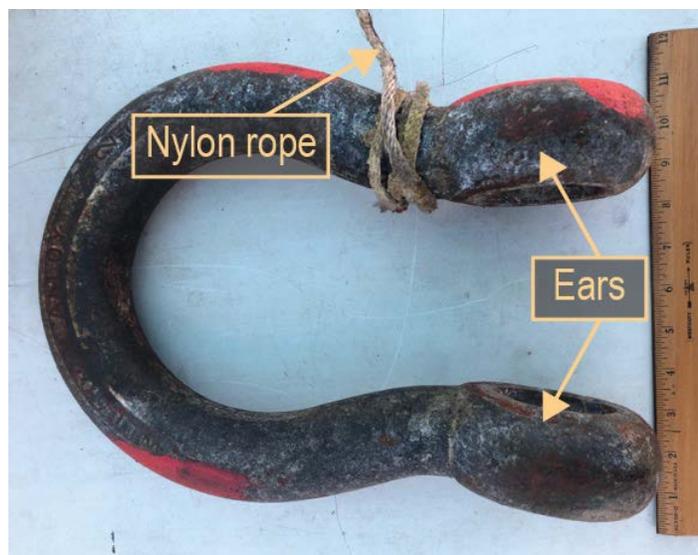
Around 0530, the sun began to rise. The captain directed the second mate to steer back to the GPS track, setting one radar at 3 miles and the other at 6 miles. About 0630, the captain spotted a target on the starboard bow about 2 miles away and steered toward it. Visibility was still poor due to the rain. The captain recalled that he could see “a faint image of a boat” as the rain squall ended. When they were about 80 feet from the *Mangilao*, they found the vessel listing to port about 15 degrees, with the port quarter submerged.

The captain stated that it appeared that the emergency tow hawser retrieval line had washed onto the deck and become entangled. The crew described the *Mangilao* as appearing to have taken on water in the stern compartment. One crewmember thought the water seemed to be coming in through a hatch on the deck, but he could not be sure. The seas were estimated by the captain to be 3–4 meters (about 10–13 feet) and washing onto the port quarter “at greater points forward of the towing bitts on the aft deck.” The captain explained that it was too dangerous for him to allow his crew on board the *Mangilao* to try and stop the water ingress because the bow was beginning to rise higher out of the water.

At 0742, the *Mangilao* submerged and sank. Using his personal satellite phone, the captain contacted the company and the Coast Guard to notify them of the sinking. Expecting conditions in their current location to further deteriorate due to the intensifying tropical storm to their north, StormGeo advised the crew to evacuate to their position as soon as possible and make their best speed to safe haven via the San Bernardino Strait.

Additional Information

The captain told investigators that when they retrieved the towing gear, it all came on board except for the shackle pin that was secured to the 50-ton shackle closest to the *Mangilao*. He stated that “apparently, the chain was not of sufficient length to clear the fendering and it [the shackle pin] worked, it worked itself loose. Because we had it cotteder [fastened using the pin] and we had it safety shackled.” Although he could not physically see the shackle pin working loose, he “imagined” that the “vertical movement of this fender placed it in contact with the pin.” He recalled wondering if the chain was long enough on the first day they got into larger seas (when the pitching motion of the *Mangilao* increased).



Recovered 50-ton shackle with nylon rope, bent ear, and missing pin. (Source: Coast Guard, annotated by NTSB)

The Coast Guard requires drug testing be conducted within 32 hours of the incident; however, despite having the supplies to perform the testing on board, the captain said he did not

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complete testing due to high seas both offshore and inland of the Philippines.³ Drug testing was conducted upon the crew's arrival to Subic Bay, 5 days after the *Mangilao* sank.⁴ Test results were negative for all crewmembers. Alcohol testing was not conducted because by the time the crew arrived in port, the timeframe for conducting testing had passed.

The captain had worked for Cabras Maritime Corporation for about 8 years. He stated that he was the "author" of the DSM tow plan and that he had towed several large tugboats from Guam to the Philippines in the past for this company. No company training was required for the development of their internal tow plans. The captain stated that he learned to construct tow plans as a result of on-the-job training and his personal experience.

According to the Ports and Waterways Safety Act, the Coast Guard has the authority to regulate the movement of vessels, including dead ships, that present a hazardous condition. Section 202 says, "Hazardous condition means any condition that may adversely affect the safety of any vessel, bridge, structure, or shore area or the environmental quality of any port, harbor, or navigable waterway of the United States." Because this towing operation was a fairly "normal" undertaking (a towing vessel was being used to tow another vessel—a "dead ship"—from one location to another), the Coast Guard did not require more than the towing diagram and the pre-departure inspection.

The ship had waited to depart until a Coast Guard marine inspector completed a DSM towing inspection, which the Coast Guard deemed necessary due to the complexity of the multi-day operation, in which one towing vessel would be pulling another towing vessel through a navigational channel in Apra Harbor, Guam, then through open ocean to another country during typhoon season. The inspection took about 2 hours to complete. The inspector noted that the captain wanted to get under way due to both impending weather and availability at the drydock once they reached the Philippines.

According to the inspector responsible for the DSM assessment, a survey was conducted of the vessel's primary and emergency towing arrangements. This inspection included verifying that the exterior structure of the vessel was watertight, and the towing equipment matched that included in the tow diagram sketched by the *Chamorro* captain. The captain stated that some of the watertight fittings "were not in the greatest condition." All of the watertight doors installed on the *Mangilao* were going to be replaced when they reached Subic Bay with new watertight doors and hatches that were strapped down on the aft deck of the vessel on a pallet. The inspector stated that everything on the deck of the *Mangilao* was secured for an ocean transit.

³ Coast Guard regulations (46 *Code of Federal Regulations* 4.06-3(b)) state, "Drug testing must be conducted on each individual engaged or employed on board the vessel who is directly involved in the SMI (Serious Marine Incident). The collection of drug-test specimens of each individual directly involved must be conducted within 32 hours of when the SMI occurred, unless precluded by safety concerns directly related to the incident."

⁴ Urine drug testing is limited to identifying urinary metabolites of cocaine, codeine, morphine, heroin, phencyclidine (PCP), amphetamine, methamphetamine, methylenedioxymethamphetamine (MDMA), methylenedioxyamphetamine (MDA), methylenedioxyethylamphetamine (MDEA), tetrahydrocannabinol (THC), oxycodone, oxymorphone, hydrocodone, and hydromorphone.

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Analysis

Investigators reviewed the weather information available to the crew prior to their departure, and the forecasts were accurate. The captain was aware of the impending tropical storm, but at the time he made the decision to get under way, a typhoon had yet to be forecast. The captain said he was confident that he would be able to successfully complete the voyage in a timely manner because he was prepared to use the weather-routing service to assist him in making decisions, which he logged in the vessel logbook along the route. The weather-routing service aided him in maneuvering around the worst part of the storm for the majority of the voyage.

The crew stated, and the vessel's logbook confirmed, that they monitored the tow regularly during their watches. Although they were in heavy weather conditions throughout the transit, they said there were no issues with the *Chamorro* or *Mangilao* between the departure on July 29 and the morning of August 5, aside from restricted visibility due to the rain and sea conditions.

It is likely that the chain from the bitt on the foredeck of the *Mangilao* was not long enough for the attached shackle to clear the fendering on the bow. In heavy seas, as the vessel pitched and the bow of the vessel lifted up over the waves, the shackle likely made repeated contact with the fendering. Around 0400 on August 5, the towline's 50-ton shackle (closer to the *Mangilao*) opened, causing the towline to drop from the *Mangilao*. Crew statements and the recovered shackle indicated that at some point, the shackle's securing cotter pin broke or worked loose, thereby likely allowing the shackle bolt's securing nut to work loose. The bend in the recovered shackle indicated the load was uneven for a time, which could have occurred when the pin was partially retained in only one ear, bending the ear with the pin remaining inserted. Once the pin worked out, or snapped off, the *Chamorro* became immediately disconnected from the *Mangilao*. Had the chain been longer and the shackle extended out beyond the bow fender, the chain, rather than the shackle, would have contacted the bow. This likely would have prevented the shackle pin securing mechanism (cotter pin) from failing, and the tow would have remained connected.

Because the towline remained intact for the first 4 days of the voyage, it is likely that seas were able to board and began to slowly flood the vessel through fittings on deck. It was known that the watertight integrity of the vessel was suspect, as evidenced by the company's plan to replace the watertight doors and hatches. Boarding seas may also have dislocated one or more of the watertight fittings, leading to more rapid flooding. If the *Mangilao* was flooding, the added water weight would have put greater stress on the towing components. Once the towline arrangement for the *Mangilao* failed, leaving it dead in the water, it is likely that seas more easily boarded the vessel and continued to flood it, leading to its eventual sinking.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the sinking of the *Mangilao* was the failure of the *Chamorro*'s towing arrangement due to the loss of a towline shackle pin, which left the *Mangilao* adrift and resulted in the ingress of water from boarding seas in a developing typhoon.

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Vessel Particulars

| Vessel | <i>Mangilao</i> | <i>Chamorro</i> |
|----------------------------|---------------------------|---|
| Owner/operator | Cabras Marine Corporation | Cabras Marine Corporation |
| Port of registry | Apra Harbor, Guam | Tanapag Harbor, Saipan |
| Flag | United States | United States |
| Type | Towing Vessel | Towing Vessel |
| Year built | 1982 | 1974 |
| Official number (US) | 1209746 | 562043 |
| IMO number | 8130760 | 7520047 |
| Classification society | N/A | N/A |
| Construction | Steel | Steel |
| Length | 106.8 ft (32.6 m) | 105 ft (32 m) |
| Draft | 13 ft (4 m) | 12.5 ft (3.8 m) |
| Beam/width | 31.5 ft (9.6 m) | 30 ft (9.1 m) |
| Tonnage | 336 GT ITC | 387 GT ITC |
| Engine power; manufacturer | Unknown | 2 x 850 hp (634 kW); CAT diesel engines |
| Persons on board | 0 | 10 |

NTSB investigators worked closely with our counterparts from Coast Guard Sector Guam throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA19FM045.

Issued: September 24, 2020

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under Title 49 *United States Code*, Section 1131(b)(1). This report is based on factual information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, “[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” Title 49 *Code of Federal Regulations*, Section 831.4.

Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. Title 49 *United States Code*, Section 1154(b).