



National Transportation Safety Board

Marine Accident Brief

Explosion and Subsequent Sinking of Barge *Alaganik*

Accident type	Fire/Explosion	No. DCA19FM042
Vessel name	<i>Alaganik</i>	
Location	Delong Dock, Canal Passage; Whittier, Alaska 60°46.72' N, 148°39.96' W	
Date	July 7, 2019	
Time	2339 Alaska daylight time (coordinated universal time – 8 hours)	
Injuries	1 fatal	
Property damage	\$700,000 est. (\$300,000 for vessel; \$400,000 for pier damage)	
Environmental damage	1,001 gallons gasoline and 895 gallons diesel fuel consumed by fire or released into environment; light oil sheening observed	
Weather	Visibility 10 miles, overcast, winds calm, seas calm, air temperature 58°F, water temperature 58°F, sunset 2321, evening twilight 0103 ¹	
Waterway information	The Delong Dock is on Canal Passage, a deep narrow protected inlet in Prince William Sound. Tides were mixed and ranged up to 17 feet in July 2019.	

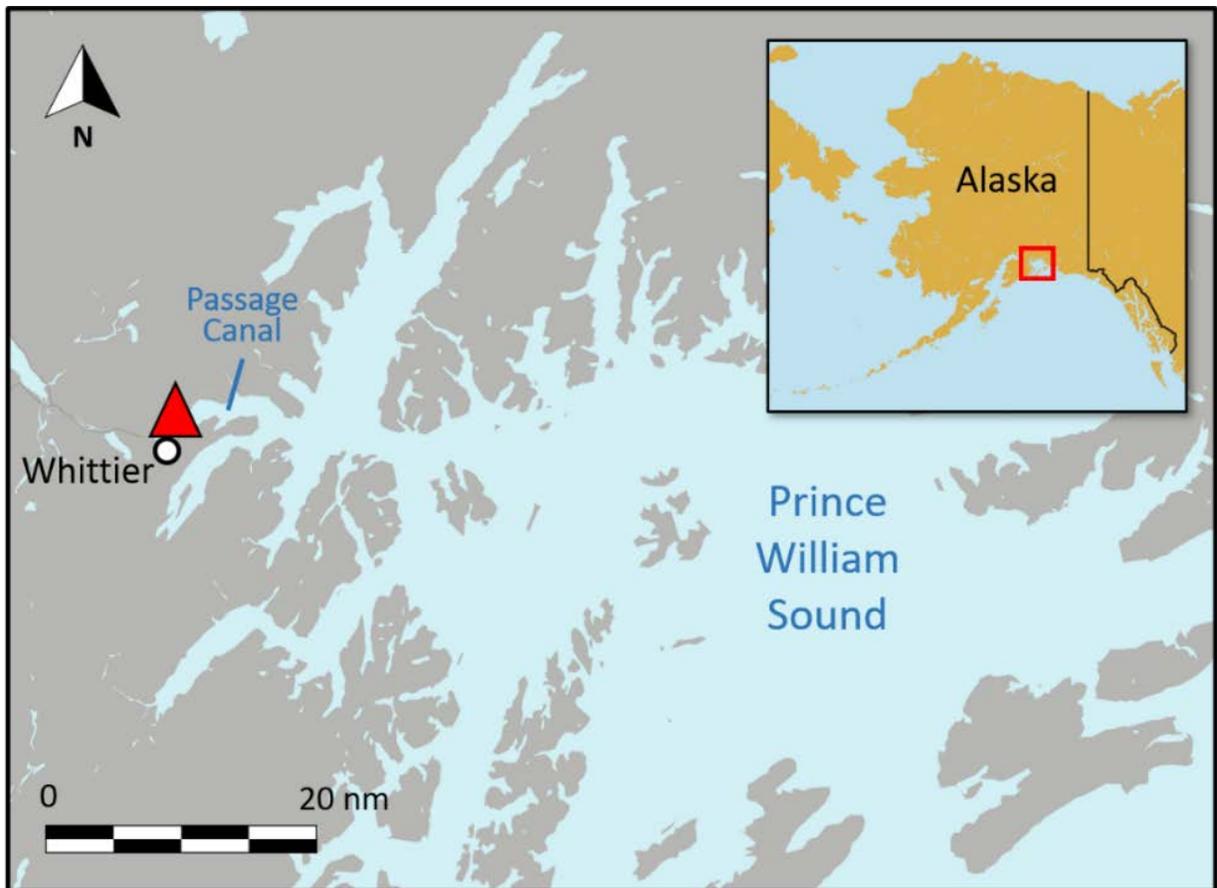
On July 7, 2019, at 2339 local time, an explosion occurred on the barge *Alaganik* as it was moored port side to the end of the Delong Dock in Whittier, Alaska. The vessel was serving as a platform for pumping fish cargo ashore from fishing vessels and tenders that came alongside. It also provided diesel fuel and gasoline to the fishing vessels. No cargo operations were ongoing when the explosion occurred. Despite the efforts of shore-based responders to fight the ensuing fire, the vessel eventually sank in 60–80 feet of water. The single crewmember aboard the vessel died in the explosion. About 1,896 gallons of gasoline and diesel fuel stored on board the vessel were consumed by the fire or released into the environment. The vessel was a total loss at an estimated value of \$300,000. Pier damage was estimated at \$400,000.



Alaganik before the accident. (Source: Vessel owner)

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

Explosion and Subsequent Sinking of Barge *Alaganik*



Area of accident where the *Alaganik* explosion occurred, as indicated by the red triangle. (Background Source: Google Maps)

Background

The 98-foot-long, aluminum-construction *Alaganik* was custom-built in 1974 as a small integrated tugboat and barge, and the two units that made up the combination were purchased by the current owner in 2006. Following a grounding in 2013, the owner removed the engines from the tugboat and permanently welded the tugboat and barge together. From thereon, the vessel was employed in various tasks, including oceanographic research, fish farming, and fish tendering. The former tugboat provided berthing space and a galley for the crew, while the barge remained the working area of the vessel.

In July 2019, Whittier Seafood, LLC, chartered the *Alaganik* for use as a platform for pumping fish ashore while moored at the end of the Delong Dock. The arrangement allowed fishing vessels and tenders to more easily offload their catch despite the large tidal range alongside the dock. The charter contract also included a requirement for the *Alaganik* to supply fuel to the fishing vessels.

Accident Events

About 1425 on July 3, the *Alaganik* was towed into position and moored at its Delong Dock berth to begin preparations for operations with Whittier Seafood. Over the next couple of days, the owner and a vessel crewmember completed various tasks to ready the barge, including installation of a pump on deck for transferring fish catch from fishing vessels to containers on the pier. Once

Explosion and Subsequent Sinking of Barge *Alaganik*

preparations were complete, the owner departed the vessel about 1900 on July 6. The crewmember remained aboard *Alaganik* and was assigned duties to receive and dispense fuel and assist with the offload of cargo from fishing vessels coming alongside.

The charter contract required the *Alaganik* to supply both diesel fuel and gasoline to the fishing vessels. The barge was carrying diesel fuel when it arrived in Whittier, but it did not have gasoline. Therefore, about 1600 on July 7, the vessel took delivery of 1,001 gallons of gasoline from a fuel truck on shore. The gasoline was loaded into one of the vessel's four fuel cargo tanks, the forward portside tank, and the *Alaganik* crewmember signed for receipt of the fuel when the transfer was completed at 1635. The three remaining fuel cargo tanks—on the port side aft, starboard side aft, and starboard side forward—contained 875, 850, and 910 gallons of diesel fuel, respectively.

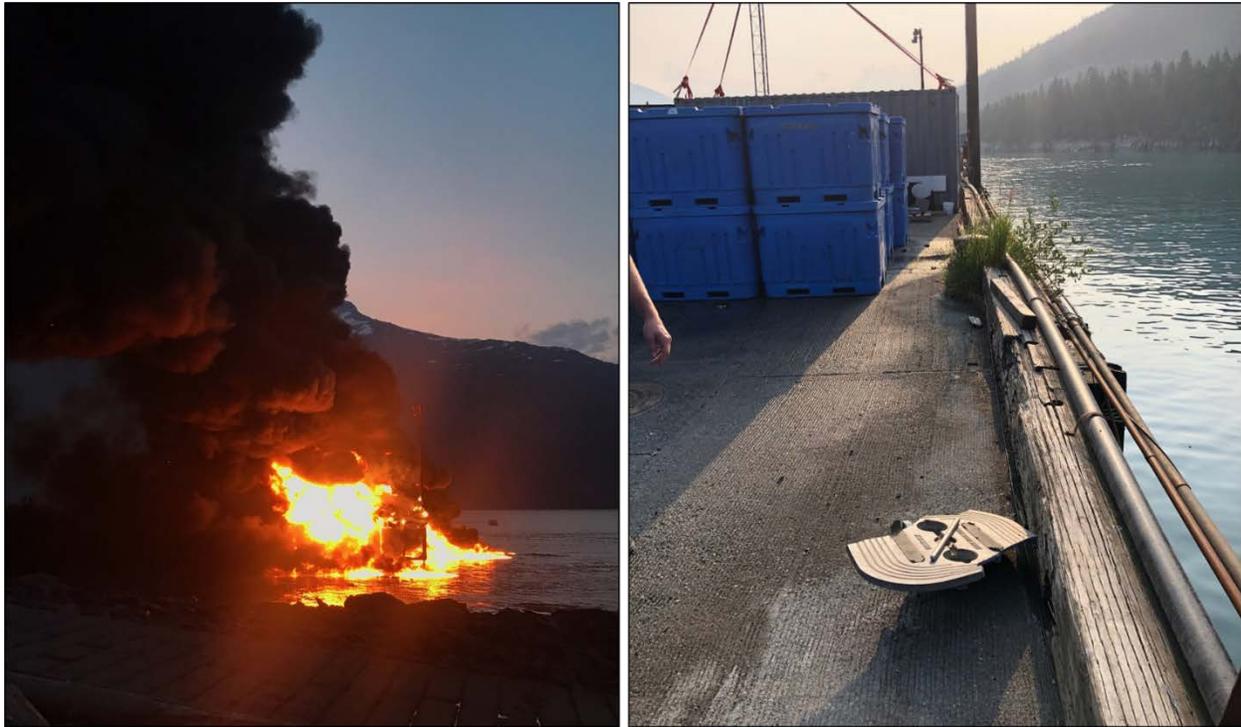
At 2339 that night, an explosion occurred on the *Alaganik*. Witnesses stated that the ensuing fire was initially concentrated on the port side of the vessel, forward. Photographs of the vessel taken just after the explosion show flames concentrated on the port side, with the vessel listing to port. The fire quickly spread to the pier, and fuel that escaped into the water around the barge also burned.



Alaganik on fire after the explosion. (Source: Coast Guard)

The fire engulfed the vessel, along with three boom-crane trucks and other equipment and gear on the pier. Shore-based firefighters responded to the pier and began fighting the fire. A Good Samaritan vessel that had been moored to the dock near the *Alaganik* got under way, threw a grappling hook over the rail of the barge, and towed the barge away from the pier. The *Alaganik* sank shortly thereafter, at 0229. The firefighters continued to fight the fire on the pier and reported that it was extinguished at 0250 on July 8. A hatch from the port side of the vessel was later found on the dock several hundred feet from the vessel's berth.

Explosion and Subsequent Sinking of Barge *Alaganik*



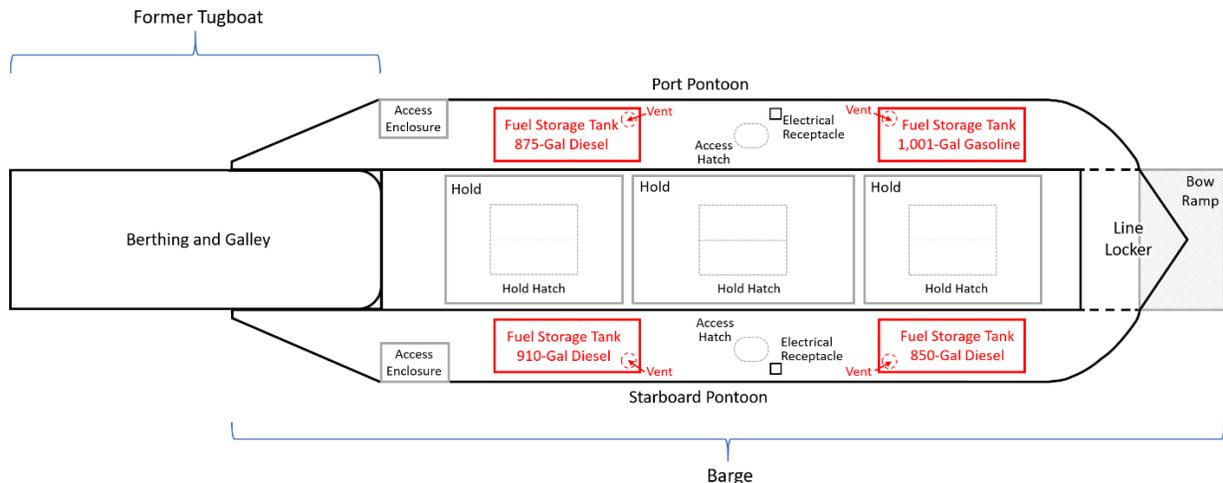
At left, fire surrounding the *Alaganik* and the pier. At right, portside hatch from the *Alaganik*, as found on the pier after the explosion. (Source: Coast Guard)

Witnesses reported seeing the lone crewmember on board the *Alaganik* walking aft from the bow toward the stern of the vessel just before the explosion. However, in the aftermath of the explosion, he could not be located. A US Coast Guard helicopter, a cutter, and an auxiliary boat conducted a search for the crewmember, covering an area of 12 square miles. Finding no one, the search was suspended after 17 hours. The crewmember's body was recovered 8 weeks later in a secluded cove about 400 yards to the northeast of the accident site.

Additional Information

Vessel details. The original barge portion of the *Alaganik* was composed of a center section, pontoons on either side of the center section, and a line locker forward of the center section used for storing gear. The main deck of the barge provided a flush working area, with cranes mounted on either side of the deck. The center section contained three holds that were accessed by 6-foot-by-7.5-foot two-piece hatches on the main deck. The pontoons were accessed via hatches midship and stairways aft leading down from weather-protected enclosures on the main deck. The pontoon and line locker compartments were interconnected without a solid bulkhead, allowing flow of air between them. The aft portions of the pontoons formed the notch that fit the former tugboat portion of the vessel. A 22-foot-long ramp was fitted on the bow and could be raised or lowered for on- and off-loading of equipment. Preaccident photos of the vessel showed “No Smoking” signs posted in several locations on the main deck.

Explosion and Subsequent Sinking of Barge *Alaganik*



Simplified general arrangement of the *Alaganik*, with fuel amounts in each fuel cargo tank at the time of the accident. Vessel hull dimensions are drawn approximately to scale.

According to a 2014 survey, the *Alaganik* was equipped with 12 float-switch-operated bilge pumps installed throughout the vessel. Power to the pumps was provided by battery or through a breaker panel on the barge. Postaccident photos of the pump installed midship in the port pontoon showed the pump's electrical leads connected to wiring via wire nuts.



Two-and-a-half-inch anti-flash pressure/vacuum vent installed on the *Alaganik* fuel cargo tanks. (Source: Vessel owner)

The fuel supplied to fishing vessels from the *Alaganik* was stored in four permanently installed 1,250-gallon capacity fuel cargo tanks located fore and aft in the pontoons on the barge. The box-shaped tanks were constructed of welded aluminum and mounted to the vessel framing; the tanks were not integral to the hull. Each tank was vented through a 2.5-inch Coast Guard-approved anti-flash pressure/vacuum vent fitted on a pipe welded through the main deck. There were about 10 inches of space between the top of the tanks and the main deck. The owner believed the tanks were connected to the vent piping by hoses, but he was not sure what type of hoses they were. (The connections were destroyed in the fire). Gauge glasses used to determine tank levels were connected via piping at the top of the tanks and discharge piping at the bottom of the tanks. According to the owner, the gauge glasses were constructed of clear plastic flexible tubing. The gauge glasses did not have automatic shutoff valves on either end of the gauge.

Fuel was pumped from the fuel cargo tanks to the waiting fishing vessels via 115-volt electric fuel pumps. The owner stated there were two pumps in the portside pontoon, one for each port tank, and a single pump in the starboard-side pontoon that drew fuel from both starboard tanks through a manifold. He said that one of the port pumps was connected via a power cord to an electrical receptacle located between the fuel cargo tanks in the pontoon, while the other pumps

Explosion and Subsequent Sinking of Barge *Alaganik*

were hardwired to a power panel. Prior to the onload of gasoline into the port forward tank on July 7, the owner stated that only diesel fuel had been carried in the fuel cargo tanks.

The aft access enclosures that contained the stairways down to the pontoons from either side of the main deck also served as the ventilation inlet and outlet for the pontoons and line locker. The owner stated that commercial electric fans, normally sold for use in carpet drying, had been placed in the enclosures to provide active ventilation. The starboard fan was rigged for supply and the port fan was rigged for exhaust, so that air flowed forward through the starboard pontoon, through the line locker, and then aft through the port pontoon. The owner said that the fans ran continuously. According to the manufacturer, the fans were not intrinsically safe or explosion-proof.

The *Alaganik* was not subject to inspection by the Coast Guard under the *Code of Federal Regulations* (CFR). A voluntary fishing-vessel dockside safety examination was conducted by the Coast Guard on the *Alaganik* in June 2008, and the decal issued at the completion of the examination expired in 2010. Dockside safety examinations—which are valid for 2 years—primarily assess the lifesaving equipment on board a vessel and do not include hull or other machinery assessments. In October 2015, dockside safety examinations became mandatory for fishing vessels operating beyond 3 miles from the territorial sea baseline or with 16 or more individuals on board. As a barge that operated near shore and had a very small crew, the *Alaganik* was not subject to this requirement.

Salvage and Damage. In late July, salvors recovered 1,740 gallons of diesel fuel and 225 gallons of hydraulic and other fluids from the sunken vessel. On August 12, the vessel was raised and transported ashore where investigators assessed the damage.

The aluminum hull plating along the forward section of the port pontoon was split and bent outward along weld seams. A significant portion of the hull plating on the bow at the line locker was missing and the remaining plating was cracked and bent outward. A hole in the hull plating midship on the starboard side showed evidence of melted metal.

The deck plating above the port pontoon and the line locker was missing. Deck plating forward on the starboard pontoon was bent or otherwise deformed upward. Deck plating aft on the starboard pontoon was missing, with evidence of melted metal. Deck plating and framing on the center section of the barge had been severely deformed or melted. Much of the deckhouse on the former tugboat section, which was constructed of aluminum, had been melted away or deformed by the heat of the fire.

The fuel cargo tank located forward in the port pontoon (the tank that had been carrying gasoline) was missing. The remaining fuel cargo tanks were in place. The fuel-level gauge tubing for each of the forward and aft fuel cargo tanks in the port pontoon was lying in the pontoon bilge, connected on one end to the discharge piping and disconnected on the opposite end. The end of the gauge line for the forward port tank appeared to be melted.

The carpet-drying fans used to provide ventilation in the pontoons and line locker were destroyed in the fire.

Explosion and Subsequent Sinking of Barge *Alaganik*



Salvaged vessel, clockwise from top left: 1) forward side plating of port pontoon; 2) bow at line locker; 3) main deck, looking aft from bow at port pontoon, with arrow pointing to approximate location of forward fuel cargo tank; and 4) bent and deformed deck plating forward on starboard pontoon.

Crewmember. The crewmember who died in the accident had been hired on June 29, 2019, to work on the *Alaganik*. The day after he was hired, the owner and crewmember conducted a vessel walk-through, during which the owner showed the crewmember how to operate all equipment. The crewmember was shown how to receive and distribute fuel, operate valves, and calculate tank volumes. The crewmember was known to be a smoker, and, according to the owner, on July 2 the owner informed him about smoking policies on board. Although discouraged, smoking was allowed near the bow ramp on the *Alaganik*. Toxicology testing during the autopsy of the crewmember's body identified methamphetamine, its primary metabolite amphetamine, and the primary inactive metabolite of marijuana. The tests did not produce a reliable result for the active parent compound for marijuana, tetrahydrocannabinol (THC). Witnesses who interacted with the crewman in the hours prior to the accident stated that he did not appear to be impaired in any way.

Analysis

The only crewmember aboard the vessel died in the explosion. The toxicology findings demonstrate evidence that the crewmember had used methamphetamine and marijuana at some time prior to the accident, but it could not be determined whether he was impaired by any of the effects of the use of these drugs at the time of the explosion.

Explosion and Subsequent Sinking of Barge *Alaganik*

Photographs of the vessel just after the explosion show flames concentrated on the port side, with the vessel listing to port. The midship hatch located aft of the forward fuel cargo tank in the port pontoon was found on the pier several hundred feet from the vessel's position. Following salvage, hull plating forward of the fuel cargo tank on the port pontoon was found to be split along weld seams and bent outward. The port forward fuel cargo tank was completely missing. Hull plating on the bow and deck plating forward on the starboard pontoon were bent outward and upward. Taken together, the evidence suggests that the initial explosion occurred in the port pontoon in the vicinity of the forward fuel cargo tank, expanding aft through the port pontoon and forward through the line locker and into the starboard pontoon.

Gasoline is more volatile and has a lower flashpoint than diesel fuel, making it far more dangerous to store, particularly in confined spaces. With a flashpoint of -45° F, gasoline forms an ignitable vapor at normal ambient temperatures. By comparison, the flashpoint of diesel fuel is 125° F. Further, the vapor density of gasoline is three to four times that of air, and thus the vapor tends to gather in low areas and enclosed spaces. Prior to the evening of the accident, only diesel fuel had been stored in the fuel cargo tanks on the *Alaganik*. Following the onload of gasoline, it is likely that escaping gasoline vapor gathered in the port pontoon around the fuel cargo tank. When this vapor ignited, the explosion occurred.

A source of ignition for the fire could not be determined following salvage of the vessel, but arcing between a plug and the electrical receptacle in the port pontoon, within a fan used for ventilation or a bilge pump motor, or across a loose wire connection for the various installed equipment are potential sources. While less likely sources of ignition, cigarette smoking materials also cannot be ruled out. Just before the explosion, the crewmember, a smoker, was seen walking aft from the bow, where smoking was permitted on the vessel, toward the stern.

Federal regulations contain provisions designed to reduce the dangers of storing gasoline on fishing vessels, but these regulations do not apply to all vessels operating in support of the industry. For commercial fishing vessels that operate with more than 16 persons on board, spaces with a gasoline cargo tank "must be open to the atmosphere and so arranged as to prevent the entrapment of vapors or be ventilated by a mechanical exhaust system with a non-sparking fan."² Under the same regulation, vessels over 79 feet in length must be fitted with a fixed gas fire extinguishing system in any space containing a gasoline tank.³

Self-propelled fish processing vessels that, incidental to their primary use, carry and dispense flammable or combustible liquid cargo in bulk have additional regulations governing carriage of fuels, including gasoline.⁴ In addition to requirements for the construction of tanks on these vessels, compartments or areas containing the tanks or pumping systems must be closed off from the remainder of the vessel by gastight bulkheads. Each compartment must be provided with a mechanical exhaust system capable of ventilating the compartment with a complete change of air every 3 minutes. The intake duct or ducts must be of a sufficient size to permit the required air change, and the exhaust duct or ducts must be located to enable the removal of vapors from the

² Title 46 CFR Section 28.340.

³ 46 CFR Section 28.320.

⁴ 46 CFR Part 105.

Explosion and Subsequent Sinking of Barge *Alaganik*

lower portion of the space or bilges. Fish processing vessels subject to these regulations must be inspected before entering service and annually thereafter to ensure compliance with requirements.

The space on the *Alaganik* containing the fuel cargo tank carrying gasoline was not closed off from other spaces by gastight bulkheads and had framing and other obstructions that could have entrapped vapors. The carpet-drying fans rigged to provide supply and exhaust ventilation were not intrinsically safe or explosion-proof and were not specifically designed to ensure a complete changeout of air every 3 minutes. There was no ventilation ducting to remove vapor from the lower portion of the port pontoon. None of the regulations that required these measures, however, applied to the *Alaganik*, an uninspected barge. Further, as an uninspected vessel, there were no regular evaluations of the vessel by Coast Guard officials to ensure the vessel was fit for the service intended. Regardless of the applicability of regulations or inspections, this accident highlights the need for caution when storing, transporting, or transferring gasoline.

In 2018, the National Transportation Safety Board (NTSB) investigated a fire aboard the small passenger vessel *Island Lady* that resulted in the death of a passenger and the loss of the vessel. Like the *Alaganik*, the *Island Lady*'s fuel tank gauge glasses were constructed of clear plastic tubing and did not have automatic shutoff valves that would have prevented fuel flow in the event the gauges were damaged. The NTSB concluded that the use of the tubing and the lack of shutoff valves resulted in the release of fuel, which contributed to the severity of the fire on the passenger vessel. When the *Alaganik* was salvaged, the gauge glass for each port fuel cargo tank was found to be disconnected on one end. On the forward fuel cargo tank gauge glass, the tubing was melted. Similar to the *Island Lady*, the material of the gauge glasses and lack of automatic shutoff valves likely resulted in the release of additional fuel from the tank that fed the fire. However, unlike the *Island Lady*, which was subject to regulations specific to small passenger vessels, the *Alaganik* was not required to have gauge glasses made from heat-resistant material or to have automatic shutoffs.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the explosion on board the barge *Alaganik* was the ignition, from an undetermined source, of gasoline vapor from a fuel cargo tank, which became entrapped within the vessel's port pontoon compartment.

Storage of Gasoline aboard Vessels

Mariners must use extreme caution when storing, transporting, or transferring gasoline because of its high volatility and flammability. Gasoline should only be stored in tanks designed to established standards, and spaces containing these tanks should be designed and ventilated according to established standards, in order to ensure gasoline vapor does not become entrapped. Vessel owners and mariners must ensure that components and equipment near flammable liquids or vapors are properly grounded and intrinsically safe.

Explosion and Subsequent Sinking of Barge *Alaganik*

Vessel Particulars

Vessel	<i>Alaganik</i>
Owner/operator	Private citizen
Port of registry	Valdez, Alaska
Flag	US
Type	Barge
Year built	1974
Official number (US)	567877
IMO number	N/A
Classification society	N/A
Construction	Aluminum
Length	98 ft (29.9 m)
Beam/width	24 ft (7.32 m)
Draft	2.5 ft (0.8 m)
Tonnage	78 GRT
Engine power; manufacturer	N/A
Persons on board	1

NTSB investigators worked closely with our counterparts from Coast Guard Sector Anchorage, Alaska, throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA19FM042.

Issued: August 6, 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).
