



National Transportation Safety Board

Marine Accident Brief

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

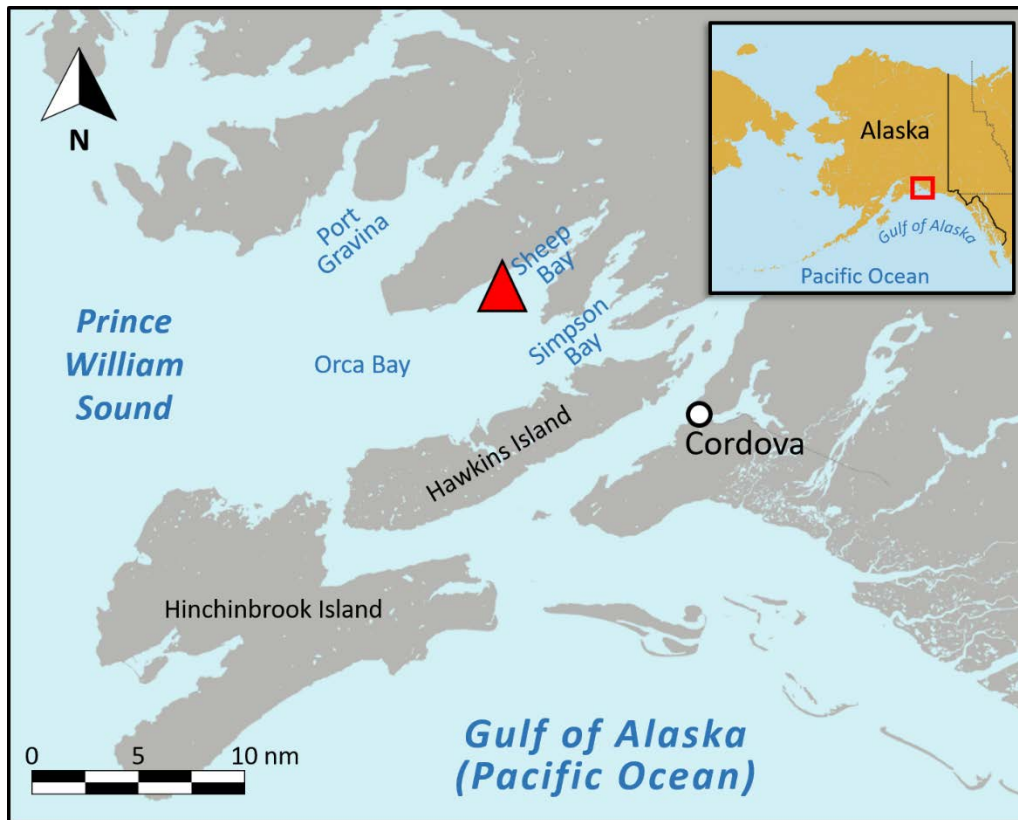
Accident type	Fire/Explosion	No. DCA19FM046
Vessel name	<i>Ariel</i>	
Location	Sheep Bay, Prince William Sound, 10 miles northwest of Cordova, Alaska 60°38.07' N, 146°4.45' W	
Date	August 26, 2019	
Time	1830 Alaska daylight time (coordinated universal time – 8 hours)	
Injuries	None	
Property damage	\$600,000 est.	
Environmental damage	About 500 gallons diesel oil on board at the time of the fire	
Weather	Visibility 10 miles, clear, winds southwest at 5 knots, seas 1–2 feet, air temperature 60°F, water temperature 57°F	
Waterway information	Sheep Bay is a small protected inlet in Prince William Sound with steep banks providing navigable water near the shoreline.	

On August 26, 2019, about 1830 local time, the fishing vessel *Ariel* was transiting Sheep Bay, Prince William Sound, Alaska, when a fire broke out in the vessel's engine room. The four crewmembers aboard the *Ariel* attempted to fight the fire, but they were unsuccessful and abandoned ship into the vessel's skiff. The *Ariel* continued to burn and subsequently sank. The crew was rescued by Good Samaritan vessels and returned to port uninjured. About 500 gallons of diesel fuel was aboard the vessel when it sank. The *Ariel*, valued at an estimated \$600,000, was a total loss.



Ariel moored before the accident. (Source: Compass Rose Marine Surveyor)

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*



Location of the *Ariel* fire and sinking, as indicated by the red triangle. (Background source: Google Maps)

Background

The 50-foot-long *Ariel* was built of fiber-reinforced plastic in 1988 and rigged as a purse seiner.¹ The vessel's engine room had a single 550-horsepower Caterpillar main propulsion diesel engine mounted centerline and a single Isuzu diesel generator on the port side. A Halon 1301 fixed fire-extinguishing system was installed on the forward bulkhead. The Halon system was a self-contained unit with an automatic high-heat actuator—it had no manual activation—and a single discharge nozzle, both co-located with the Halon storage cylinder.

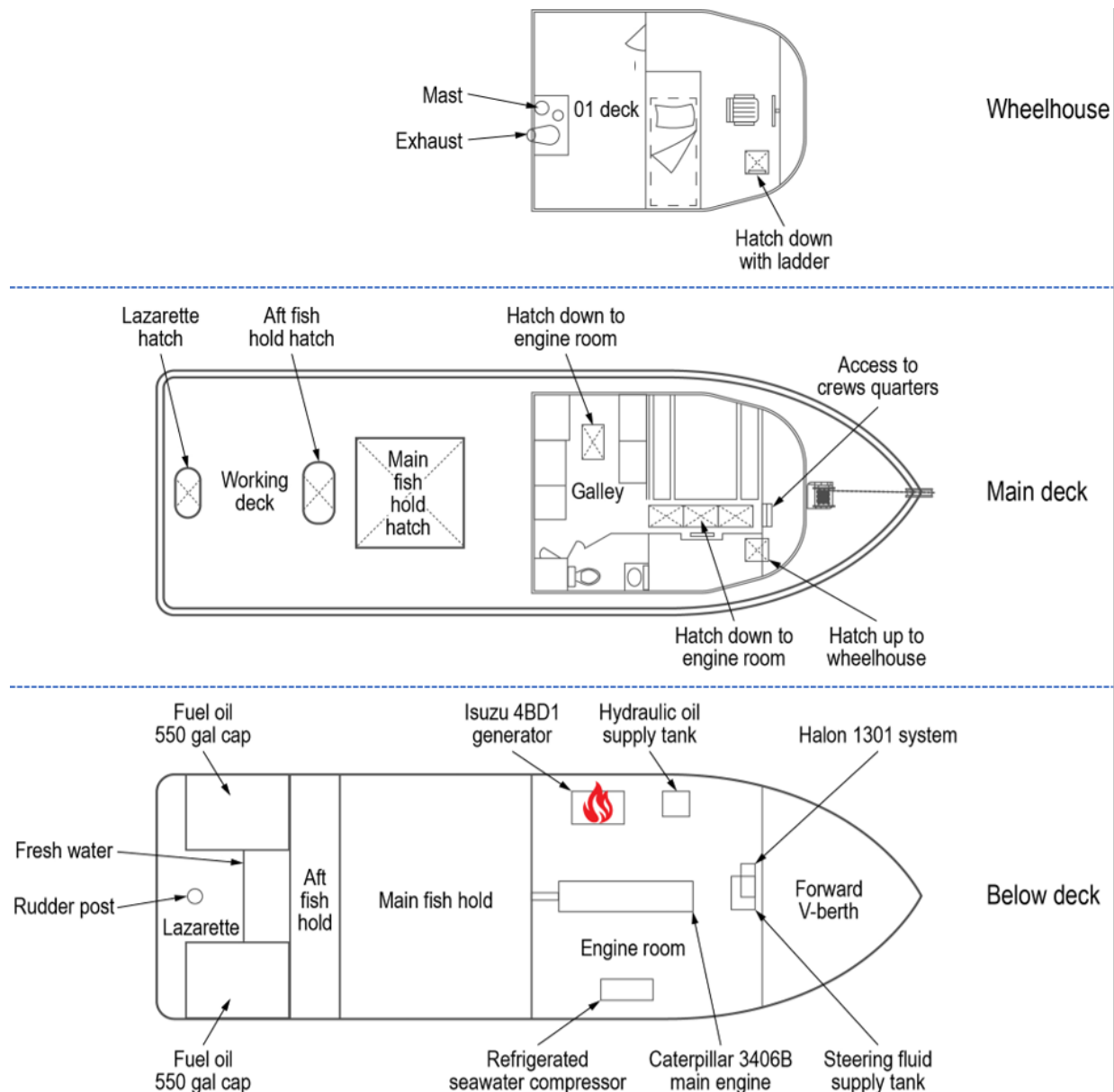
The *Ariel* worked the Prince William Sound pink salmon fishery with a crew of four, including a captain, an engineer, and two deckhands. The purse seining season in the fishery began on June 3, 2019, with the bulk of the fish caught after July 1. The fishery was managed daily, opening and closing during daylight hours depending on assessments of fish stocks gathered from aerial observations by Alaska Department of Fish and Game officials. According to the captain, the *Ariel* anchored each night after the daily closing of the fishery and, as needed, the offloading of fish to a tender.

¹ Purse seiners use a large wall of netting with floats on the top of the net and a lead line strung through rings at the bottom of the net. The net is deployed using a skiff and then circled around fish as they school or run. Once the fish are encircled, the lead line is drawn tight to close, or "purse," the bottom of the net, preventing the catch from escaping downward. The net is then pulled alongside the fishing vessel, where the fish are loaded into holds.

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

Accident Events

In the early evening on August 26, the *Ariel* had completed fishing and was transiting Sheep Bay at 5.5 knots (about 75% power) en route to a tender in the adjacent inlet. The captain was at the helm in the wheelhouse located above the vessel's cabin. According to the captain, the main fish hold, located just aft of the engine room, was full of fish, and the aft hold, located behind the main hold, was empty. About 1830, the engineer was in the cabin when he smelled smoke. He opened the main hatch to the engine room to investigate and saw flames in the vicinity of the generator. He alerted the captain and the crew and grabbed a fire extinguisher to fight the fire.



General arrangement of the *Ariel*, with the area where the fire was first reported indicated by the red flame icon.

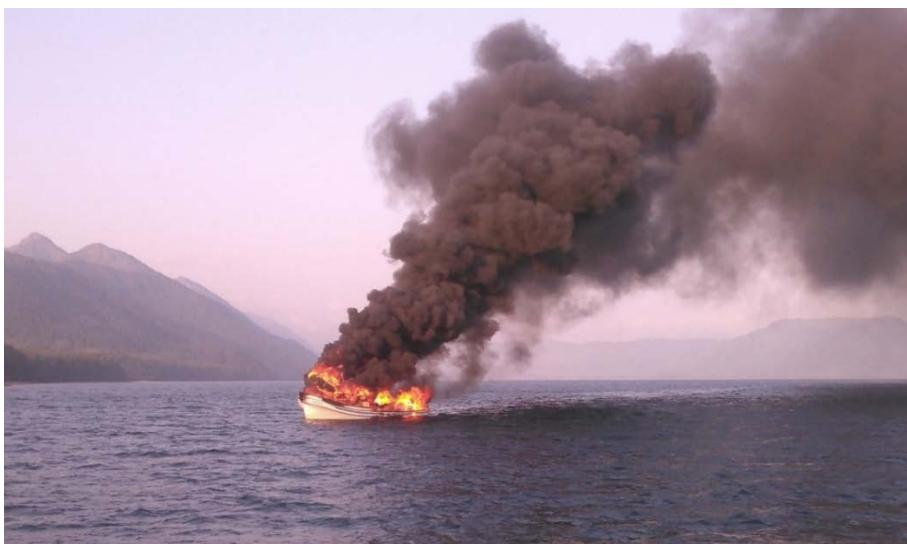
Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

Just after the engineer informed him of the emergency, the captain noted that the generator was operating erratically, with the engine rpm fluctuating significantly. Consequently, he shut down the generator from the wheelhouse. He next attempted to slow the main propulsion engine by moving the throttle lever to the idle position. He stated that the engine did not slow, however, and the throttle lever returned to its previous ahead position. The captain subsequently shutdown the main engine from the wheelhouse and instructed one of the deckhands to start the motor on the *Ariel's* skiff. His intention was to use the skiff to push the stricken fishing vessel toward shallower water. The captain then went below to assist with firefighting efforts.

When he arrived in the cabin, the captain shut the main hatch to the engine room, and the crew attempted to fight the fire with portable chemical fire extinguishers through an engine room hatch in the galley area on the port side of the cabin, which was closest to the apparent source of the fire. Their efforts were unsuccessful, and the smoke drove them out of the cabin. The crew stated that before leaving the cabin, they closed the port hatch to the engine room. The captain returned to the wheelhouse and made a Mayday call over VHF radio before he was forced out of the wheelhouse by smoke. According to the engineer, the crew also discharged extinguishers into the stacks aft on the deckhouse and the ventilation inlets on either side of the exterior cabin.

The crew determined that it would be unsafe to remain on board the *Ariel*, so the engineer went to the bow to drop the anchor, while the rest of the crew gathered their immersion suits and boarded the skiff. Once the engineer had set the anchor, he boarded the skiff, and the crew stood off the *Ariel* at a safe distance—about 100 feet by the estimation of one crewmember.

A few minutes later, the crew heard a sound, which they believed was the automatic Halon system discharging. Shortly thereafter, the smoke seemed to lessen. The engineer then re-boarded the *Ariel* to close the exterior doors to the cabin. The louvers that covered the engine room ventilation inlets on either side of the deckhouse were fixed open, so, according to the engineer, he also stuffed rain gear and other materials into the louvers in an attempt to prevent Halon from escaping the engine room. Not long afterward, the smoke increased, and the crew saw visible flames, so the engineer reboarded the skiff, and the crew once again stood off at a distance of about 300 feet.



***Ariel* on fire at 1912, prior to sinking in Sheep Bay. (Source: US Coast Guard)**

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

Nearby fishing vessels that had heard the captain's distress call began arriving at the location of the accident and picked up the crew in the skiff. The *Ariel* continued to burn for several hours and sank at 2335 in 275 feet of water.

Additional Information

Steering and propulsion could be controlled from three locations on the *Ariel*: the wheelhouse, a crow's nest on the mast, and a station on the starboard side work deck. The steering system was hydraulic, using oil as an operating fluid, and included a pump driven off the forward end of the main propulsion engine, a reservoir tank on the forward engine room bulkhead mounted under the Halon system, and a head tank mounted in the crow's nest.

The propulsion engine speed control system was also hydraulic, with an operating fluid mixture of water and anti-freeze. The throttle levers at all stations were linked to the engine and transmission via the control system. The hydraulic lines were high-pressure, temperature-treated nylon. According to the manufacturer, when a throttle was moved at one control station, the levers at the other stations also moved in the same way. The system was pressurized by compressed air and included a small hydraulic fluid reservoir tank located in the engine room on the port side of the forward bulkhead.

Another hydraulic system, which used oil as an operating fluid, powered the machinery used to handle fishing gear, such as the power blocks on the mast and a capstan on the main deck. The hydraulic pump was mechanically driven off the forward end of the main propulsion engine, and the oil reservoir tank was located on the port side forward of the generator.

The last condition and valuation survey of the *Ariel* was conducted on March 28, 2018. They surveyor found that the "vessel appeared well maintained and fit for intended use." According to the survey, the fuel lines on the *Ariel* were copper. The owner stated that the copper piping ran from the fuel tanks in the lazarette (the aftermost space on the vessel) to the engine room, and were connected to a valve manifold by reinforced rubber fuel hoses rated USCG Type A1.² From the manifold, the fuel was routed via USCG-Type-A1-rated hoses to fuel filters and then to the main engine and generator. The fuel system was fitted with manually operated fuel oil shut-off valves at the tanks in the lazarette and at the fuel filters in the engine room.

The owner and captain told investigators that the exhaust piping and the turbocharger on the main engine were fully lagged (insulated), and photos from the 2018 survey showed the lagging in place. A former owner of the *Ariel* stated that the lagging covers had been custom made for the vessel by a company based in Alaska.

The owner of the *Ariel* was a member of Alaska Marine Safety Education Association (AMSEA) and provided investigators with the *Commercial Fishing Vessel Emergency Instruction and Drill Manual* produced by the association. The owner stated that emergency drills, including fire drills, were conducted monthly on the vessel using the AMSEA program. According to the captain, the last drill on the *Ariel* was conducted on August 6. Three of the four crewmembers on

² USCG Type A1 is the highest standard of fuel hose used in boatbuilding (other standards are Types A2, B1, and B2). Per Title 33 *Code of Federal Regulation* Part 183.540, "USCG Type A1" hose must meet the following performance standards: 1) SAE Standard J1527DEC85, Class 1 and a fire test, or 2) Underwriters' Laboratories, Inc. (UL) Standard 1114.

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

board during the accident were present during the drill, and the fourth—a deckhand who joined the vessel late in the season—had previously worked on the *Ariel* and had conducted drills with the crew. Both the owner and the engineer held US Coast Guard Drill Instructor qualification cards.

Analysis

The *Ariel* was not salvaged, and thus investigators could not inspect the machinery or hull to determine an exact cause of the fire. However, observations by the crew during the accident provided some indication of the location and potential source of the fire. The engineer stated that when he first opened the engine room hatch to investigate smoke, he saw flames in the vicinity of the generator located on the port side aft in the engine room. The long delay in the heat-sensor activation of the Halon fixed fire-extinguishing system, located on the forward bulkhead of the space, further indicates that the fire started aft in the space. Thus, it is unlikely that the hydraulic systems for steering, throttle control, and deck machinery—whose main components were located forward in the space near the Halon system—were the source of the fire. (Investigators could not determine why the captain could not reduce the main propulsion engine speed prior to shutting the engine down, but based on the information above, it is unlikely that this was causal to the fire.)

The fluctuating rpm of the diesel engine generator observed by the captain just after the fire was discovered was likely the result of fuel starvation, which suggests that the fuel line to the generator's engine was breached. The fuel hoses that ran between the manifold, fuel filter, and generator met Coast Guard material specifications; however, over time a hose could have become worn from contact, its connections could have loosened through vibration, or it could have otherwise failed, allowing fuel to leak into the engine room. Leaking fuel or fuel vapor may have then come into contact with a hot surface, igniting the fire.

The vessel was fitted with manually operated fuel oil shut-offs in the lazarette and engine room; there were no remote emergency shut-offs. The crew was not able to close the manual shut-off valves before abandoning the vessel. Although not causal to the initial fire, the remaining fuel in the tanks would have continued to feed the fire once the hoses melted.

Based on crewmember accounts, the Halon fixed fire-extinguishing system on the *Ariel* activated and appeared to reduce the fire, but the fire rekindled and eventually consumed the vessel. To work effectively, fixed fire-extinguishing systems require a minimum concentration of firefighting agent to either halt the chemical reaction producing the fire, displace oxygen feeding the fire, or effect a combination of both. The fixed-open louvers on the inlets to the *Ariel*'s engine room ventilation ducts prevented the space from being sealed off, and thus the discharged Halon was allowed to escape, and new air was introduced to the fire. The engineer's attempt to seal off the ventilation inlet louvers using available materials was commendable but likely too late to prevent the spread of the fire.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the fishing vessel *Ariel* was the ignition of fuel leaking from the generator fuel supply line in the engine room. Contributing to the severity of the fire and the eventual loss of the vessel were the fixed-open inlets for the engine room ventilation, which allowed fire-extinguishing agent to escape and air to enter the space.

Closing Ventilation During Fixed Fire-Extinguishing System Activation

Fixed fire-extinguishing systems in engineering and other hazardous spaces require a minimum concentration of extinguishing agent to either halt the chemical reaction producing the fire, displace the oxygen feeding the fire, or effect a combination of both. To ensure the effectiveness of the system and prevent the reintroduction of oxygen to the space, ventilation inlets should be designed or modified to be closed remotely or covered.

Fire Aboard and Subsequent Sinking of Fishing Vessel *Ariel*

Vessel Particulars

Vessel	<i>Ariel</i>
Owner/operator	Private citizen
Port of registry	Cordova, Alaska
Flag	United States
Type	Fishing vessel
Year built	1988
Official number (US)	931891
IMO number	N/A
Classification society	N/A
Construction	Fiber reinforced plastic
Length	50 ft (15.2 m)
Draft	5.5 ft (1.7 m)
Beam/width	15.5 ft (4.7 m)
Tonnage	31 GRT
Engine power; manufacturer	1 x 550 hp (410.1 kW); Caterpillar 3406B diesel engine
Persons on board	4

NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Unit Valdez, Alaska, throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA19FM046.

Issued: March 25, 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).
