



National Transportation Safety Board

Marine Accident Brief

Fire aboard Fishing Vessel *Rose Marie*

Accident type	Fire/Explosion	No. DCA18FM033
Vessel name	<i>Rose Marie</i>	
Location	Atlantic Ocean, 67 miles east of Chatham, Massachusetts ¹ 41°36.68' N, 068°26.87' W	
Date	August 23, 2018	
Time	1030 eastern daylight time (coordinated universal time – 4 hours)	
Injuries	None	
Property damage	\$700,000 est.	
Environmental damage	None	
Weather	Visibility 10 miles, overcast, winds south-southeast 7 knots, seas 1–2 feet, air temperature 54°F, water temperature 44°F, sunrise 0545, sunset 1927	
Waterway information	Open waters in the Atlantic Ocean	

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.² 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.



Rose Marie before the accident. (Courtesy of Rose Marie Inc.)

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

² *Trawling* is a fishing practice that involves herding and capturing the target species by towing a net through the water.

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Location where the *Rose Marie* caught fire in the Atlantic Ocean, east of Chatham, Massachusetts, as identified by the red triangle. (Background source: Google Maps)

Background

The *Rose Marie* was an 87-foot-long stern trawler powered by a single Caterpillar diesel engine. The steel-hulled vessel was built in 1985 by LaForce Shipyard in Bayou La Batre, Alabama. The main deck of the vessel had a working deck aft and an accommodation space forward, which included a mudroom that provided access to the crew quarters, galley, and engine room. The interior bulkheads in the crew quarters were wood paneling over wood frames. Located above the accommodation space was the wheelhouse. Deck gear included a boom, outriggers, a winch, the net drums (one at the stern and the other behind the wheelhouse), and the trawling nets. Below deck areas, from forward to aft, were divided into a water tank, a forepeak, an engine room, a fish hold, a gear locker, and a lazarette.

Accident Events

After departing New Bedford, Massachusetts, the previous morning, the *Rose Marie* arrived at the fishing grounds at Georges Bank, east of Chatham, Massachusetts, on August 23 at 0545. The crew consisted of the captain, a mate, and two deckhands, who all had sailed with the vessel previously. They intended to spend the next 8 days trawling for ground fish such as cod, haddock, pollock, flounder, and other bottom-dwelling species. 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 captain stated that while the engine was at "slow ahead," and all hands were on deck, the crew lowered the net off the stern 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.

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Reacting to the smoke, the captain and the deckhand brought the net back on board. The captain went inside the mudroom, looked down into the engine room through the open engine room door, and found the space was full of black smoke. He told investigators he could see only the top three steps of the ladder leading to the bottom of the engine room.

The captain then ran up to the wheelhouse and radioed the US Coast Guard as black smoke entered that space. The vessel was not outfitted with a fixed fire-extinguishing system; on board were eight handheld fire extinguishers: six dry chemical and two CO₂. There was also one grenade-type aerosol extinguisher designed to smother fires in spaces.³



Grenade-type aerosol fire extinguisher used initially to combat the fire sits on the deck of the engine room near the entrance ladder. At left, two photos from the manufacturer's website demonstrate how the device activates.

To extinguish the fire, the crew first 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 where black smoke was first observed. Next, the crewmembers discharged the five additional extinguishers at the base of the cable trunk in the accommodation space underneath the ladder to the wheelhouse.⁴ The flames prevented them from reaching the two CO₂ fire extinguishers in the engine room.

Despite the crew's efforts, the fire spread to the galley through the rectangular-shaped cable trunk. Constructed of plywood, the cable trunk extended vertically from the overhead of the engine

³ *Grenade* refers to the deployment of the device, which includes pulling a pin and tossing the device into a room or compartment. In its user manual, the manufacturer of the DSPA-5 stated that this "intervention tool" releases an aerosol of solid iron and plaster particles through slits on the side within 25 seconds of being activated.

⁴ A *cable trunk* is an enclosure, usually with a rectangular cross section, that protects cables and provides space for other electrical equipment.

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room through the galley up to the wheelhouse. 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, each operated by an electric pump in the engine room. (The *Rose Marie* was not fitted with a dedicated fire pump.) However, both hoses, which had been used less than half an hour earlier during the last net unloading, had no pressure.

Within 10 minutes of the flames reaching the galley, the crewmembers prepared to abandon ship. Once they grabbed the emergency position-indicating radio beacon (EPIRB), they placed the 8-person liferaft canister in the water at the bow, then pulled it to the stern and inflated it. Having donned their survival suits, the crew entered the liferaft directly from the stern ramp, without entering the 44°F water, and paddled away from the burning vessel. The mate stated that from the liferaft, he witnessed the large net wrapped around its drum just aft of the wheelhouse “go up like a torch.”

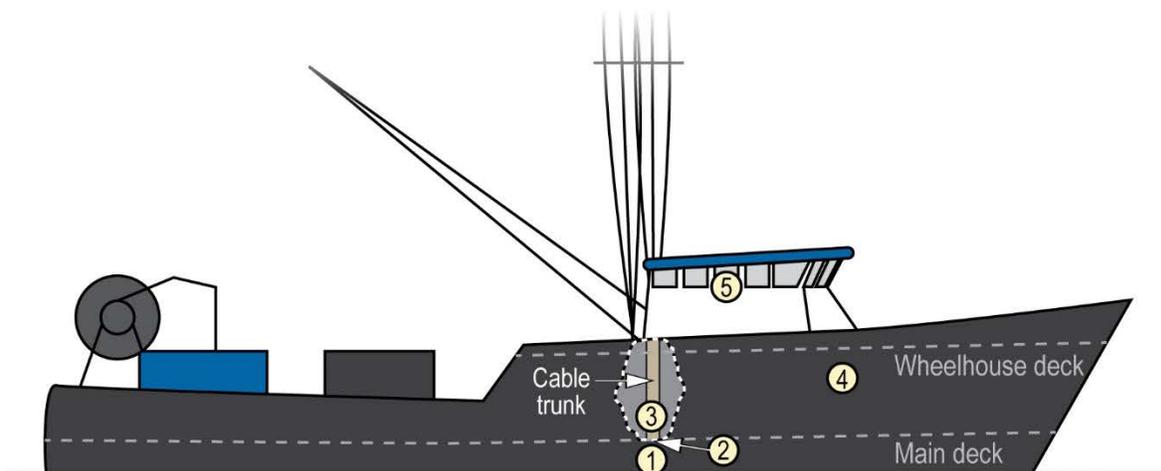
Thirty minutes after the crewmembers entered the liferaft, the fishing vessel *Seven Seas*, which was transiting nearby, took them on board. The next morning, they were transferred to the towing vessel *Morgan*.

At 1425, about 4 hours after the fire was discovered, the Coast Guard cutter *Legare* arrived on scene, and its crew engaged in firefighting operations from alongside. However, they stopped their efforts 25 minutes later, based on the concern that the firefighting water could flood and sink the vessel. The cutter remained with the *Rose Marie* until 0934 the next day, shortly after the tugboat *Morgan* began towing the vessel to the Port of Fairhaven, Massachusetts.



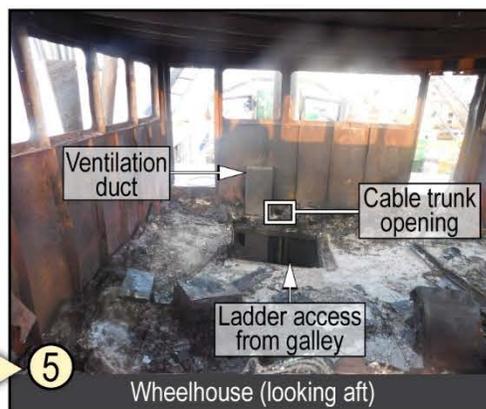
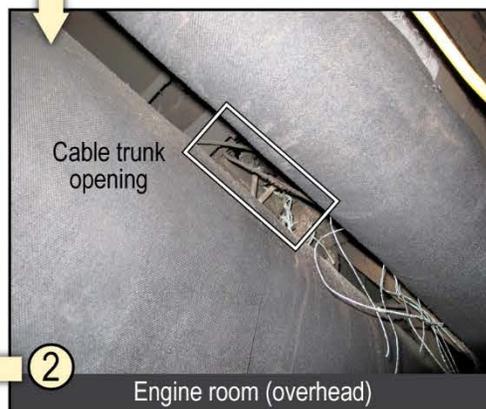
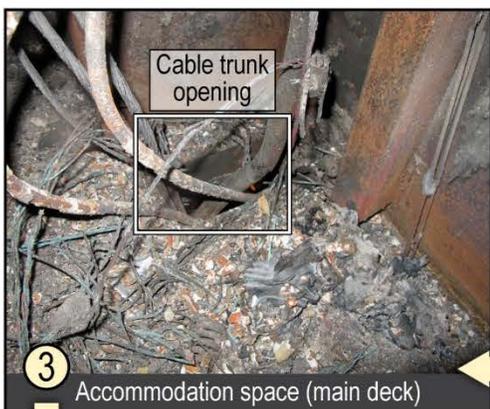
Video screenshot of the *Rose Marie* from the Coast Guard's aircraft, which had been dispatched to the fire. The camera's crosshairs capture the flames consuming the net on the drum.

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Photos of fire damage trace the fire's path through the *Rose Marie* as flames

1. began above the main engine in the engine room,
2. traveled through the wooden cable trunk opening overhead,
3. entered the accommodation space through the cable trunk opening,
4. spread to the galley and throughout the accommodation space, and
5. entered the wheelhouse through the cable trunk and ladder access.



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Additional Information

The captain, who normally served as the mate on the *Rose Marie*, had sailed with the vessel for more than 30 years. The mate had 1.5 years on board the vessel and 45 years of fishing experience. One deckhand had worked 15 years on board the *Rose Marie*; the other had a few months aboard the vessel and 3 years of fishing experience.

According to the latest survey of the vessel (in 2016), the *Rose Marie* was described as being “well maintained and operated.” The captain told investigators that he had changed the engine lubrication oil before the trip and that he was not aware of any maintenance issues prior to the accident voyage.

A week after the accident, investigators examined the damaged vessel out of the water. The interiors of the wheelhouse and the accommodation space, which included the galley and crew quarters, were consumed by fire. Investigators found some heat and flame damage in the engine room and in the space forward of the engine room. Most of the damage appeared on the starboard side and higher in the compartment near the overhead where the wooden cable trunk was located. Investigators found no evidence of heat damage in the vicinity of the engine room door that had been left open by the crew to ventilate the space while under way.

According to the Fairhaven Fire Department’s report, there was significant damage to the wiring above the main engine that would have required an extensive amount of heat. The electrical inspector assisting the investigators stated that the copper wires had melted.⁵ In his opinion, “the wiring above the engine could be a cause of ignition,” likely the result of “arcing.” Arcing is “a high temperature luminous electrical discharge across a gap or through a medium such as a charred insulation,” as defined by the National Fire Protection Association.⁶ An arc can be caused by a loose or corroded wire connection, or by a failure in the wire’s insulation, that creates an intermittent contact with exposed metal contact points. A fire results if the arc connects with surrounding combustible materials. The chain of events can start by merely opening a switch or breaking a wire.

The fire report also indicated that the fire could have been caused by a fluid leak from the net drum hydraulic system used to haul in the nets just prior to the appearance of black smoke. Investigators found a thin coating of hydraulic oil on the hydraulic oil pipes and electric wires above the main engine. If a line or a fitting had leaked, allowing fluid to drip onto the operating, hot main engine, a fire may have ignited, as the report noted.

Analysis

Considering the minimal damage found in the engine room and the flames’ path to the accommodation space, 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 the fire, 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. If a hydraulic fitting leak resulted in fluid contacting a hot engine surface, the fluid

⁵ Copper melts at a temperature of 1,981°F (1,083°C).

⁶ *NFPA 921: Guide for Fire and Explosion Investigation*, Section 3.3.8—Arc.

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may have ignited into flames that spread up through the plywood cable trunk directly above the main engine to the accommodation space and wheelhouse.

A second potential source was the electrical wiring above the main engine at the base of the cable trunk. The fire report stated that the significant damage to the copper core wiring could have resulted from arcing. Arcing could have 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. A source, like the wooden cable trunk and stairwell, would start to burn at 356°F, the minimum temperature needed to ignite wood.

The exact source of the fire could not be determined, but 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 on the *Rose Marie* was steel, but the cable trunk running through it was constructed of uninsulated flammable material (wood). As an uninspected fishing vessel, the construction of the cable trunk on the *Rose Marie* was not subject to any fire-protection regulations, as required for the construction on Coast Guard-inspected vessels. For example, on inspected passenger vessels, regulations stipulate the length of time bulkheads, decks, and overheads must prevent the passage of flames and smoke.⁷ A vertical trunk penetration through an overhead must be designed or insulated to withstand the same temperature rise limits as the boundary (bulkheads and decks) penetrated. Had the trunk opening on the *Rose Marie* 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 in the engine room. It was rated for spaces up to 5,300 cubic feet in volume, “considering there are no big (ventilation) holes or openings,” according to the manufacturer. Although investigators calculated that the engine space was less than 5,300 cubic feet, the aerosol extinguisher was not effective. 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. Further, the wooden cable trunk served as a ventilation path. Therefore, the handheld aerosol grenade was rendered ineffective. Although fishing vessels the size of, and operating in water similar to, the *Rose Marie* are uninspected by the Coast Guard, fire extinguishers aboard these vessels are regulated by the Coast Guard. The owner chose to carry the grenade-type aerosol extinguisher in addition to the other fire equipment on board the vessel, although it did not meet the requirements for portable fire extinguishers established by the Coast Guard.

⁷ Title 46 *Code of Federal Regulations* (CFR), Part 116.415.

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Probable Cause

The National Transportation Safety Board determines that 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.

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Vessel Particulars

Vessel	<i>Rose Marie</i>
Owner/operator	Rose Marie Inc.
Port of registry	Boston, Massachusetts
Flag	United States
Type	Commercial fishing vessel
Year built	1985
Official number (US)	680986
IMO number	8856376
Classification society	N/A
Construction	Steel
Length	87 ft (26.5 m)
Draft	9.5 ft (2.9 m)
Beam/width	24 ft (7.3 m)
Gross tonnage	159
Engine power; manufacturer	624 hp (465 kW) diesel engine; Caterpillar model 3412
Persons on board	4

NTSB investigators worked closely with our counterparts from Coast Guard Sector Southeastern New England throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA18FM033.

Issued: September 4, 2019

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).
