



National Transportation Safety Board

Marine Accident Brief

Engine Room Fire On Board Fishing Vessel *Arctic Storm*

Accident no.	DCA13LM022
Vessel name	<i>Arctic Storm</i>
Accident type	Fire
Location	North Pacific Ocean, about 46 nautical miles west of Aberdeen, Washington 46° 49' N, 124° 54' W
Date	May 20, 2013
Time	1505 Pacific daylight time (coordinated universal time – 7 hours)
Injuries	None
Damage	Est. \$5 million
Environmental damage	None
Weather	Northwest winds at 10 knots; clear skies; visibility 8 nautical miles; air temperature 55°F; current at 3.1 knots
Waterway information	North Pacific Ocean fishing grounds off the coast of Washington state

On the afternoon of May 20, 2013, a fire broke out in the engine room of the uninspected fishing vessel *Arctic Storm* as it was under way in the North Pacific Ocean, about 46 nautical miles west of Aberdeen, Washington, conducting fish processing operations. The crew extinguished the fire through the combined use of portable extinguishers, fixed suppression, and fire hoses. No injuries or pollution resulted from the accident. The estimated damage to the *Arctic Storm* was \$5 million.



The *Arctic Storm* during the fire emergency. (Photo by the United States Coast Guard)

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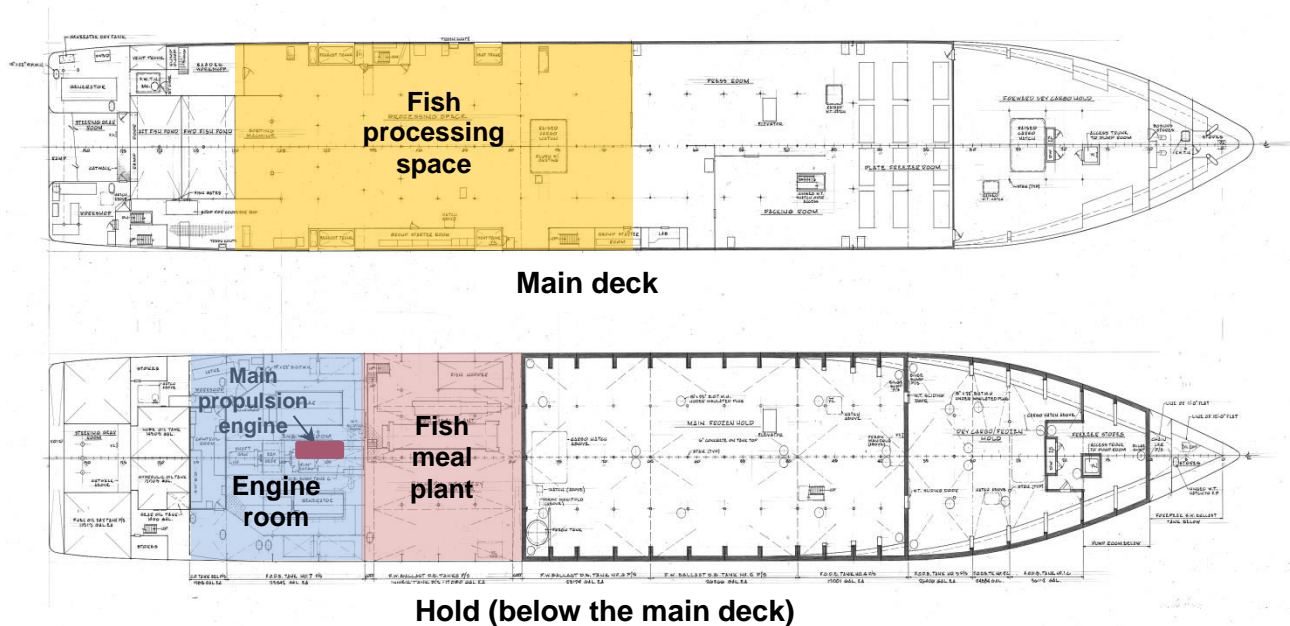
Satellite image of the accident area in the North Pacific Ocean off the coast of Washington state. The red triangle shows the location of the *Arctic Storm* when the engine room fire broke out. (Background by Google Earth)

About 1505, the chief engineer had just entered the engine room when he noticed a fire in the overhead area above the main propulsion engine. He also noticed that the turbocharger on the engine's starboard side was engulfed in flames. He radioed the captain on the bridge, and then he and the on-watch oiler exited the engine room, which was quickly filling with smoke. The oiler proceeded to the fish processing space, located directly above the engine room, and alerted the workers there.

The captain had already heard the main engine's fire alarm activate moments earlier. He looked out the bridge window and saw a large amount of smoke pouring out of the engine room's ventilation outlets. He also saw that some crewmembers on deck were beginning to respond to the emergency. The captain sounded the vessel's general alarm and radioed vessels in the area for assistance. The Coast Guard heard this callout as well. Because the *Arctic Storm* was conducting fish processing operations that included smaller fishing vessels working nearby, several of those vessels responded.

The *Arctic Storm* crewmembers reported to their muster stations to begin coordinating the fire response. At the chief engineer's request, the captain remotely shut down the engine room's ventilation systems and closed its watertight doors to contain the fire. The chief engineer also instructed the engineering crew to ensure that the engine room's power panel emergency stops, ventilation emergency stops, and remote quick-closing valves for the fuel oil storage tanks all were activated.

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Layout of the *Arctic Storm*'s main deck (top image) and hold (bottom image; the hold is located directly below the main deck). (Original drawings by Jensen Maritime Consultants, Inc.)

Crewmembers dressed in firefighting gear initially fought the fire using portable extinguishers. At first, this method successfully suppressed the fire, but when the crew stopped applying CO₂, the fire quickly reflash. Shortly after the fire originally started, the crew had shut down the vessel's main electrical generator, located in the engine room near the main engine, because electrical cabling in the overhead was on fire and arcing. As a result of shutting down the main generator, the *Arctic Storm* lost electrical power and so did the engine room fire pump. The crew then tried using the forward fire pump, located outside the engine room in a forward space, and staged fire hoses at the engine room entrance. However, no firefighting water was available because the forward fire pump was inoperative (the electrical cables that connected this pump to the standby generator passed through the engine room, and the insulation on the cables had been burned in the fire, rendering the pump inoperative).

After several failed attempts to extinguish the fire with portable extinguishers, the chief engineer obtained the captain's permission to release the Halon fixed fire suppression system into the engine room. Following release of the Halon system, the chief engineer monitored the ventilation outlets for changes in the smoke's appearance and saw that the amount of smoke decreased and that its color changed from black to white. By this time, responding vessels had arrived on scene and provided support equipment, including two portable diesel-powered fire pumps, which the crew set up to supply water to the vessel's fire main system. About 30 minutes after the Halon system had been released into the engine room, the captain saw that smoke was still exiting through the engine room ventilation outlets, indicating that the fire was not completely extinguished and had in fact begun regaining strength. At this time, about 1730, the captain decided to evacuate nonessential crewmembers from the *Arctic Storm* to the assisting vessels. Seventy-six crewmembers and two fisheries observers were evacuated to three nearby fishing vessels. Forty-two crewmembers remained on board the *Arctic Storm*.

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The firefighting team re-entered the engine room and noted fires in the overhead as well as in the fish meal plant, located forward of the engine room. After making several re-entries, the crew was able to extinguish all remaining fires and cool down the area using fire hoses and portable extinguishers.

About 0530 the next morning, a responding tugboat began towing the *Arctic Storm* to Aberdeen, where the vessels arrived about 2245.

As a result of the fire, the upper portions of the *Arctic Storm*'s engine room near the main propulsion engine were extensively burned. The combustible components located in the overhead area—such as electrical wiring insulation, lighting fixtures, and ventilation motors—were melted or entirely consumed by the fire. The insulation on electrical power cables in a cableway located above the main engine had completely burned away, leaving only bare copper conductors. These cables provided electrical power to equipment located in spaces forward of the engine room. In addition, the area near the starboard forward side of the main engine, both upper and lower, was damaged. The engine components in this area appeared to be the most heavily damaged from the fire, with paint burned off the engine components, rubber expansion joints melted, and fire soot deposited on most surfaces. Damage to the adjacent fish meal plant, located just forward of the engine room, included charred and burned hard-foam insulation on the overhead; however, no equipment was damaged.

After the fire was extinguished, the chief engineer found a vent valve lying atop one of the engine's attached pumps. He determined that the valve was associated with the fuel oil piping system located on the engine's starboard-side fuel oil header near the starboard-side turbocharger. The valve had become detached from the fuel oil piping system as a result of a fracture at its threaded connection fitting. The quarter-inch, 2,000-psi valve had been installed at an elevated position at the forward end of the fuel oil piping system, and it was used to vent air from the system as needed. After the accident, the crew pressure-tested the fuel oil piping system and found no abnormal leaks or openings other than at the vent valve connection.

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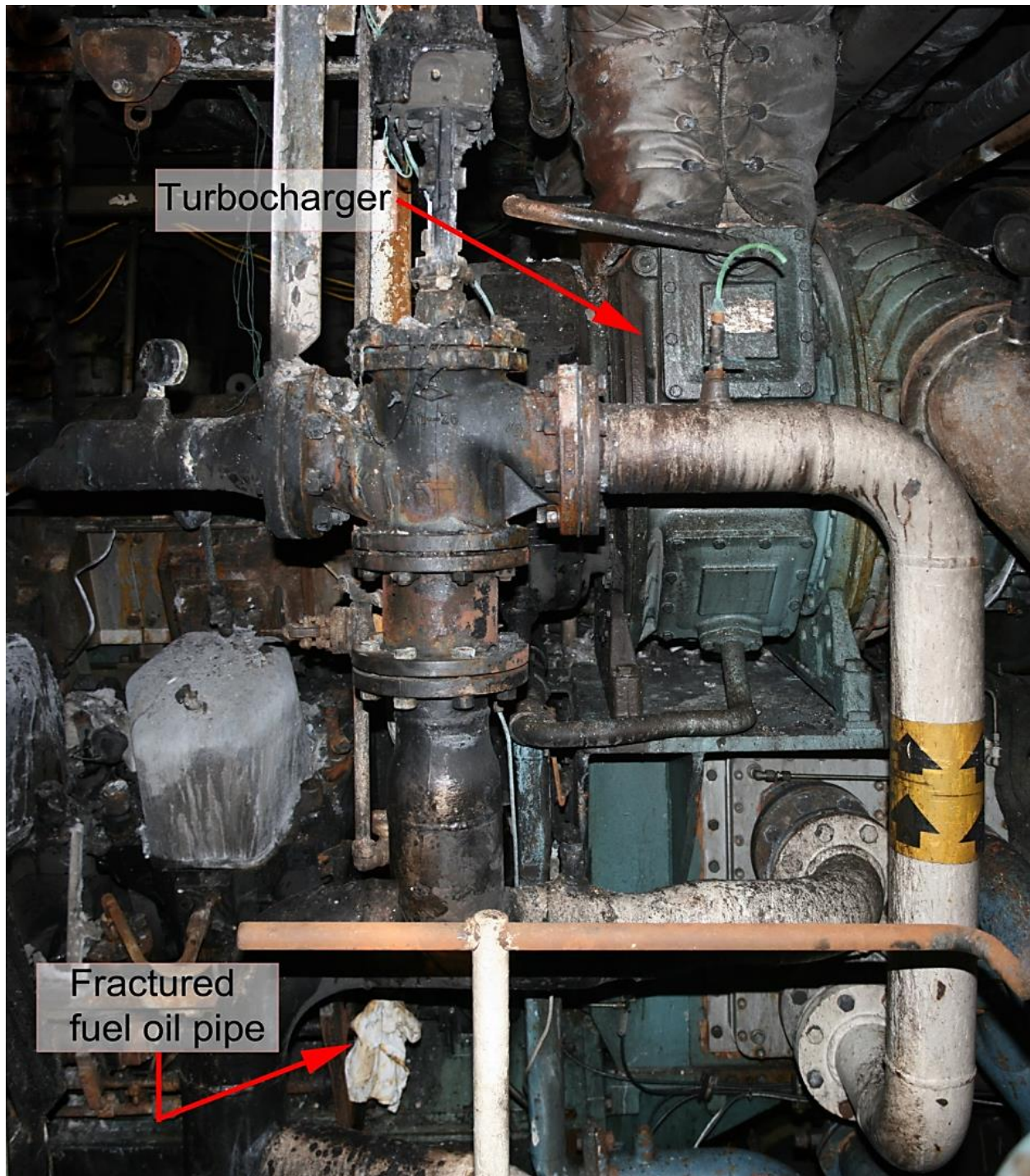
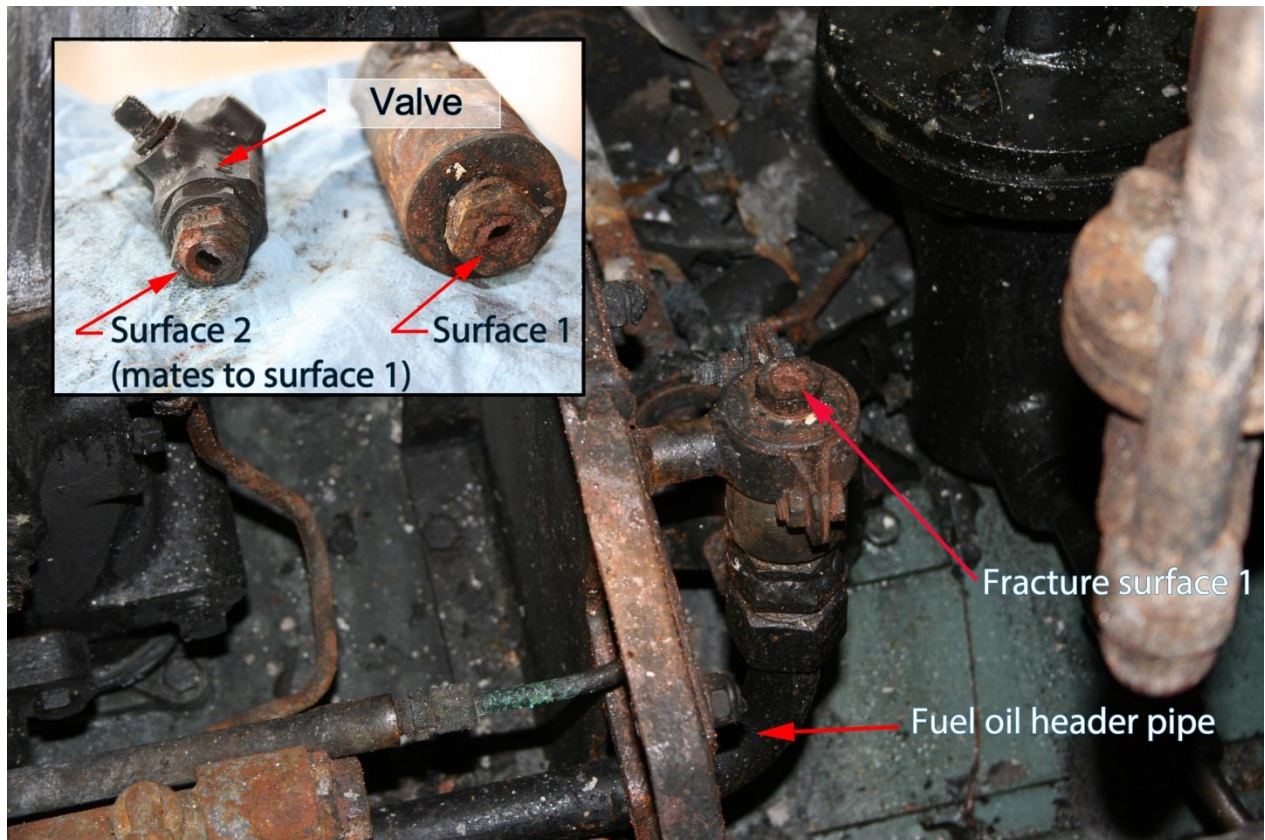


Photo of the area with the most fire damage, near the main propulsion engine's starboard-side turbocharger. Shown is the location of the fuel oil pipe fitting (covered by a white rag) that was found to be fractured.

At the request of the vessel's insurers, a forensic engineering firm metallurgically examined the fracture surface of the valve fitting. The analysis report indicated that the fracture resulted from "ductile overload with a torsional component." The analysis report also found that the appearance of the fracture indicated that "the fitting fractured due to a single load, such as an impact, that caused it to separate."

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Composite image of the quarter-inch fuel oil vent valve and pipe fitting fracture surfaces. The larger photo shows the valve as installed on the main propulsion engine, below the starboard-side turbocharger at the forward end of the fuel oil header.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire on board fishing vessel *Arctic Storm* was a fractured fitting on a fuel oil vent valve, located on the main propulsion engine, which resulted in fuel oil spraying onto a hot engine surface and igniting.

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Vessel Particulars

Vessel	<i>Arctic Storm</i>
Owner/operator	Arctic Storm Management, Inc.
Port of registry	Seattle, Washington
Flag	United States
Type	Fishing – factory stern trawler
Year built	1941, rebuilt 1988
Official number (US)	903511
IMO number	8720113
Classification society	Det Norske Veritas (DNV)
Construction	Steel
Length	314.3 ft (95.8 m)
Draft (mean)	19 ft (5.8 m)
Beam/width	48.5 ft (14.8 m)
Gross and/or ITC tonnage	3,854 gross tons, 4,068 ITC tons
Engine power, manufacturer	5,750 hp (4,288 kW) Stork-Werkspoor model 16 W 280, medium-speed diesel
Persons on board	120

Adopted: May 29, 2014

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 49 *United States Code* 1131. This report is based on factual information provided by the US Coast Guard from its informal investigation of the accident. The NTSB did not conduct its own on-scene investigation.
