Issued June 7, 2023 MIR-23-11

Fire aboard Yacht *Pegasus*

At 0204 local time on July 15, 2022, the 79.9-foot-long yacht *Pegasus* caught fire while moored at the Peninsula Yacht Basin in Gig Harbor, Washington.[1] No persons were on board, and the fire burned for about an hour before it was reported. By the time firefighters arrived, the fire had engulfed the aft section of the yacht and the flames could not be completely extinguished. The fire was eventually doused when the vessel sank by its stern at its berth. The *Pegasus* was a total loss, estimated at $1.5 million. A vessel docked nearby also suffered minor damage.

Figure 1. Recreational yacht *Pegasus* before the casualty. (Source: vessel owner)

[1] (a) In this report, all times are Pacific daylight time, and all miles are statute miles. (b) Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA22FM029). Use the CAROL Query to search investigations.

Casualty type	Fire/Explosion
Location	Peninsula Yacht Basin, Gig Harbor, Washington 47°20.32′ N, 122°35.23′ W
Date	July 15, 2022
Time	0204 Pacific daylight time (coordinated universal time –7 hours)
Persons on board	0
Injuries	None
Property damage	$1.5 million est.
Environmental damage	Diesel fuel reported in water, mostly contained within an oil boom
Weather	Visibility 10 mi, winds west-northwest 3 mph, air temperature 57°F, water temperature 54°F
Waterway information	Recreational vessel marina within small bay, current 1 knot or less, depth 6 ft

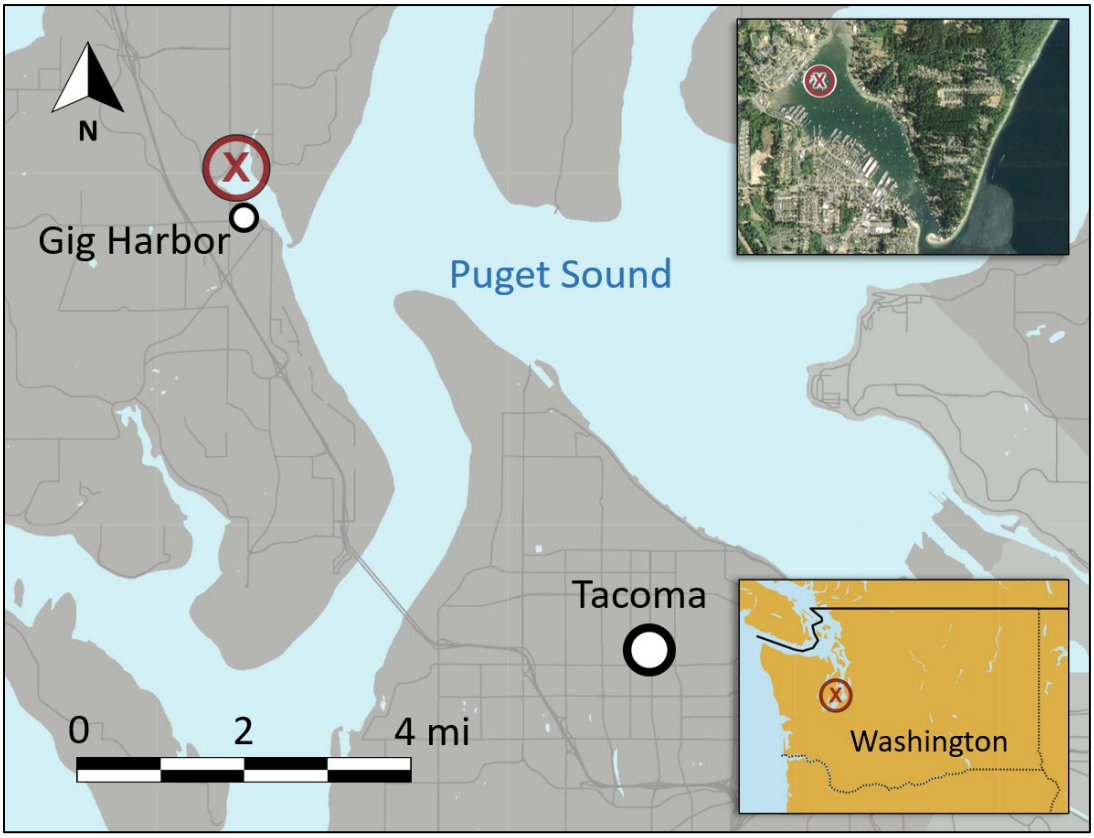

Figure 2. Location of the *Pegasus* fire, as indicated by a red *X*. (Background source: Google Maps; satellite image: Google Earth)

1. Factual Information

1.1 Background

The *Pegasus* was a privately owned recreational yacht. The 93-gross-ton fiber-reinforced-plastic vessel was constructed in 2012 by Fairline Yachts in Oundle, United Kingdom. Interior spaces on the main deck comprised a navigation/control station, a galley, and a salon. Above the cabin and aft deck, a fly bridge included an additional navigation/control station and seating areas.

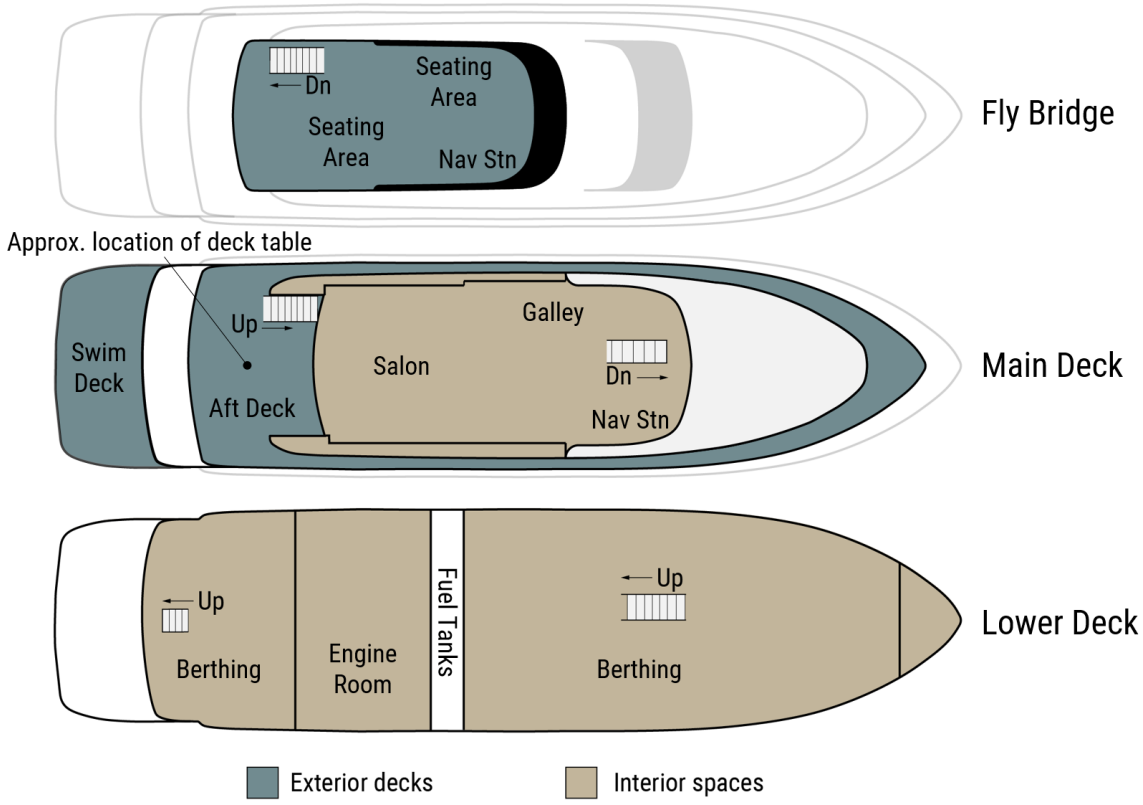

Figure 3. General arrangement plan views of the yacht *Pegasus*.

1.2 Event Sequence

The *Pegasus* was moored at the outer berth at the end of the Peninsula Yacht Basin pier and docks, which extended 600 feet into the Gig Harbor inlet. The floating docks were about 5 feet wide. There were no marina staff or other personnel on the docks overnight. Visibility of the *Pegasus* from shore was partially obscured by other vessels moored at the facility.

At 0204 on July 15, Peninsula Yacht Basin security cameras first captured smoke and flames emanating from the aft section of the *Pegasus*. In the video, the fire burned for about 45 minutes before intensifying and spreading forward.

At 0302, a bystander noticed the fire and called 911. Gig Harbor Police officers arrived at the marina at 0316, followed 4 minutes later by firefighting units. The police officers found the aft half of the *Pegasus* completely engulfed in flames, with the fire threatening a vessel moored nearby. Firefighters laid out fire hose from a shore plug to the end of the long pier and docks. The hose was charged, and firefighting efforts commenced at 0332 from the floating docks on the starboard side of the *Pegasus*. Nine minutes later, a firefighting boat arrived and started fighting the blaze from the opposite side of the vessel. A second fire hose was rigged from shore and charged, with water on the fire at 0342.

Firefighters knocked down the flames, but the fire was persistent and continued to flare up. At 0414, the stern of the *Pegasus* sank with the bow rising out of the water. The bow then slowly settled as the vessel continued to take on water. The last of the fire was extinguished at 0431, when the main deck cabin was inundated with seawater.

Figure 4. Yacht *Pegasus* fire at 0322 local time, just before the arrival of firefighters at the vessel's berth. (Source: Gig Harbor Police Department)

1.3 Damage

A Pierce County Fire Prevention Bureau fire marshal conducted a postcasualty investigation of the fire. During the investigation, the fire marshal and other parties examined the salvaged *Pegasus*. In the report of the investigation, the fire marshal described the damage to the vessel as follows:

> The exterior of the stern, swim deck, transom, and aft deck had sustained significant fire damage. Charring and mass loss of the fiberglass components was observed in these areas. Upon the aft deck, which served as an outdoor dining area, combustible materials of a table and bench seat had been consumed. The deck under the approximate location of the table had a significant area of burn through to the compartment space below.

The fire marshal's report stated that fire damage spread from the aft deck horizontally, forward and aft, and vertically, down to the engine room. The fly bridge collapsed onto the salon and galley forward of the aft deck, and combustible materials in the salon and galley were consumed by the fire. Describing damage in the engine room, the fire marshal stated:

> Components which were nearest the ceiling such as hoses and plastic housings had experienced deformation and melting. Plastic and rubber components lower to the floor of the engine bay compartment were observed intact.

The *Pegasus* was a total loss; damage to the nearby vessel was minor.

1.4 Additional Information

Coast Guard investigators and the Pierce County fire marshal interviewed the owner of the *Pegasus*. He stated that the vessel had no known electrical issues. Electrical components were examined after the vessel was salvaged, and no anomalies were noted other than heat damage from the fire. The electrical shore power pedestal on the dock that the *Pegasus* had been plugged into was also examined, and no anomalies were found.

The *Pegasus* owner told the NTSB that he believed the likely cause of the fire was fireworks that landed on the vessel. The marina's security camera footage, which began at 0059, showed no activity around the yacht before the smoke and flames were captured at 0204.

The vessel owner and his employee told investigators that, on the day before the fire, they had been refinishing wood surfaces of the vessel using a name-brand teak oil

finish. The teak oil was applied to the surfaces with a brush, and excess oil was wiped off using microfiber towels. The employee stated that, after completing the work, he wrapped the used towels in new towels, placed them in a plastic bag, and left the bag under the wood table on the aft deck of the yacht. He and the owner then left the vessel between 1600 and 1700 that same evening.

The oil finish used by the owner and employee was sold in metal cans with the following warning printed on the label:

> DANGER: RAGS, STEEL WOOL OR WASTE SOAKED WITH WATCO® TEAK OIL MAY SPONTANEOUSLY CATCH FIRE IF IMPROPERLY DISCARDED. IMMEDIATELY AFTER EACH USE, PLACE RAGS, STEEL WOOL OR WASTE IN A SEALED WATER-FILLED METAL CONTAINER. FOR DISPOSAL OF RAGS AND UNUSED AMOUNTS OF PRODUCT CONTACT YOUR LOCAL OR STATE GOVERNMENT ENVIRONMENTAL CONTROL AGENCY.

The product contained raw linseed oil, a substance known to be a risk for self-heating and spontaneous combustion when soaked in rags.

In its investigation of the 2012 fire on board the passenger vessel *Safari Spirit*, the NTSB found that workers oiled the exterior teak deck and that the rags used to apply and clean up the oil from the teak wood finish were laid across rails to dry.[2] The NTSB determined that the fire "ignited due to unknown causes and was accelerated by the flammable materials stored on the aft portion of the main deck." In the report, the NTSB noted that:

> Self-heating is a process in which heat is created within a material through a biological or chemical process and without the application of an external heat source. If self-heating increases the temperature of the material above its ignition point with sufficient oxygen present, self-ignition can occur. Sufficient air must be present to sustain the combustion reaction, but not so much air that the heat is dissipated. Common examples of materials that can self-heat/self-ignite are linseed oil rags, coal dust, hay, wood chips, manure, and latex.

In its bulletin *Safety with Oily Rags*, the National Fire Protection Association explained:[3]

[2] *Fire on Board Passenger Vessel* Safari Spirit, Marine Accident Brief NTSB/MAB-13/12. Washington, DC: NTSB.

[3] National Fire Protection Association, *Safety with Oily Rags.* 2019. oilyragssafetytips.pdf (nfpa.org)

> The oils commonly used in oil-based paints and stains release heat as they dry. If the heat is not released in the air, it builds up. That is why a pile of oily rags can be dangerous. As the rags dry, the heat is trapped. The heat builds up and finally causes a fire.

In his report of the *Pegasus* fire investigation, the Pierce County fire marshal made the following determination:

> Based upon fire patterns, fire dynamics, and witness statements, the origin of the fire was between the transom and the salon on the aft deck. On a probable basis, the cause of the fire was due to the improper disposal of rags soiled with the Watco Teak Oil product resulting in spontaneous combustion of the rags. Combustibles first ignited excluding the rags would be the table and bench located on the aft deck. Energy released from these furniture items would be adequate to involve the vessel's construction components and propagate fire advancement.

The fire marshal classified the cause of the fire as "accidental."

2. Analysis

The marina's security cameras did not capture any activity around the *Pegasus* between 0059 (when the video began) and when the fire was first captured at 0204, making it unlikely that undetected arson or accidental human interference such as a lit cigarette or fireworks could have caused the fire. Further, there was no evidence to suggest the fire was caused by an electrical system failure, and damage to engine room components indicated that the fire originated above the space and was not the result of a mechanical issue.

The first visual evidence of the fire in the security camera videos was on the aft portion of the *Pegasus*, and the Pierce County Fire Prevention Bureau fire marshal found extensive damage on the aft deck. He noted that there was "mass loss of fiberglass" in that area and that the wood table and bench had been consumed by the fire.

The day before the fire, the owner's employee had placed a bag with rags soaked with a raw-linseed-oil product under the table on the aft deck. The Pierce County fire marshal determined that, on a probable basis, the fire aboard the yacht *Pegasus* was caused by the spontaneous combustion of the oil-soaked rags that had not been properly discarded. The NTSB agrees with that determination and has noted in the *Safari Spirit* investigation that rags soaked in oil-based finish are a risk for spontaneous combustion. Additionally, the product container included a warning of this hazard. The location of the origin of the fire aboard the yacht was on the aft deck where rags had been bagged and stored.

The narrowness of the docks and the distance between the fireplug ashore and the *Pegasus*'s berth, at the end of the 600-foot-long pier and docks, made firefighting efforts more difficult. However, because the fire burned for an hour before being reported, allowing it to grow in intensity and spread throughout the vessel, it is unlikely that the *Pegasus* could have been saved.

3. Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the recreational yacht *Pegasus* was spontaneous combustion due to the self-heating of used oil-soaked rags that had been improperly disposed of on the aft deck of the vessel.

3.2 Lessons Learned

Fire Hazard with Oily Rags

Rags soaked with oil-based finishes, which are commonly used for painting and refinishing, pose a fire hazard if stored improperly. Because they generate heat as they dry, oily rags that are piled up, put together in a trash can, or bagged do not allow the heat to escape, creating a high risk for spontaneous combustion. To prevent a fire, users of oil-based products (or any chemical product) should carefully follow the manufacturer's instructions for cleanup and disposal of rags, steel wool, brushes, and other applicators.

Vessel	*Pegasus*
Type	Yacht/Boat (Recreational yacht)
Owner/Operator	Private citizen (Private)
Flag	United States
Port of registry	Roche Harbor, Washington
Year built	2012
Official number (US)	1240035
IMO number	N/A
Classification society	N/A
Length (overall)	79.9 ft (24.4 m)
Breadth (max.)	18.7 ft (5.7 m)
Draft (casualty)	5.3 ft (1.6 m)
Tonnage	93 GRT
Engine power; manufacturer	2 x 1,650 hp (1,230 kW); Caterpillar C32 diesel engines

NTSB investigators worked closely with our counterparts from **Coast Guard Sector Puget Sound** throughout this investigation. The NTSB would also like to thank the **Pierce County Fire Prevention Bureau** for its work in investigating the fire.