



AVIATION



HIGHWAY



MARINE



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PIPELINE

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MIR-22/10

Fire aboard Fish Processor *Aleutian Falcon*

On February 17, 2021, about 2232 local time, a fire was reported on the commercial fish processor *Aleutian Falcon* while the vessel was docked for repairs at the Trident Seafoods shipyard in Tacoma, Washington.¹ Firefighting crews from the Tacoma Fire Department responded, and the fire was extinguished over 4 days later on February 22. No one was on board the vessel at the time of the fire, and there were no injuries reported. An estimated 20-30 gallons of hydraulic oil leaked into the water but were captured by a containment boom. The vessel was declared a constructive total loss with an estimated value of \$16,460,850.



Figure 1. *Aleutian Falcon* pierside before the fire. (Trident Seafoods)

¹ (a) In this report, all times are Pacific standard time, and all miles are nautical miles. (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA21FM016). Use the [CAROL Query](#) to search investigations.

Casualty type	Fire/Explosion
Location	Pier 25, Tacoma Harbor, near Tacoma, Washington 47°17.05' N, 122°24.7' W
Date	February 17, 2021
Time	2232 Pacific standard time (coordinated universal time -8 hrs)
Persons on board	None
Injuries	None
Property damage	\$16,460,850 est.
Environmental damage	20-30 gallons of hydraulic oil contained by boom
Weather	Visibility 10 nm, overcast, winds east 4 kts, calm water, air temperature 41°F, water temperature 46°F
Waterway information	Bay, pier side depth 44 ft



Figure 2. Area where the *Aleutian Falcon* fire occurred, as indicated by the red X. (Background source: Google Maps)

1. Factual Information

1.1 Background

The *Aleutian Falcon* was a steel-hulled uninspected commercial fishing vessel outfitted to process cod and salmon in Alaskan waters. The vessel was built as an offshore support vessel by Halter Marine of Chickasaw, Alabama, in 1981 and originally named the *Petromar Falcon*. It was renamed, lengthened, and converted to process fish in 1988 at Bender Shipbuilding and Repair Company of Mobile, Alabama, and in 2004, the vessel was acquired by Trident Seafoods. Since 2017, the vessel had been used primarily to process salmon in Bristol Bay, Alaska, from May through August/September, after which it served as a bunkhouse (to house those who worked in the company processing plant) in Akutan, Alaska, in the Aleutian Islands.

The *Aleutian Falcon* had five decks: the pilot deck, with a pilothouse where the crew navigated the vessel; the bridge deck, which consisted of staterooms; the shelter deck, which contained staterooms and galley-related areas forward and crew accommodations aft; and the main and hold decks, which contained mainly fish processing rooms, a refrigerated cargo hold, various machinery spaces, storage rooms, offices, and workshops.

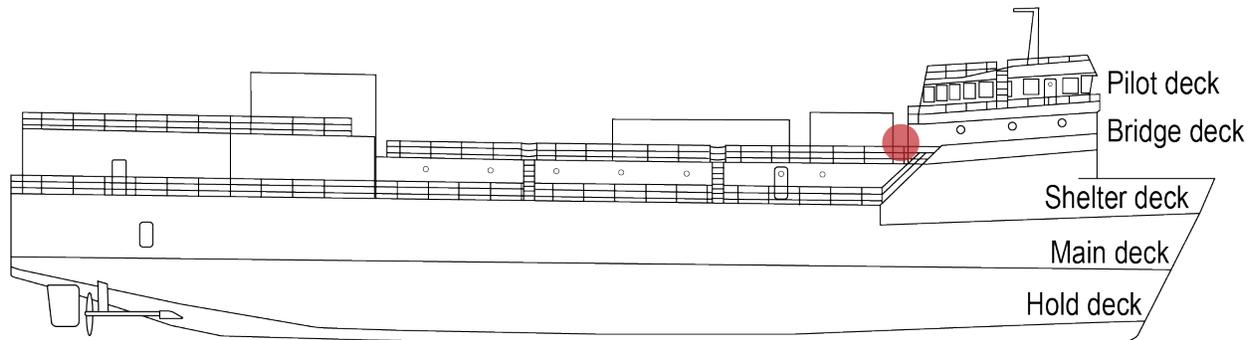


Figure 3. *Aleutian Falcon* profile, with initial location of fire indicated with a red circle. (Background source: Trident Seafoods)

1.2 Event Sequence

On August 3, 2020, after finishing its salmon processing season in Alaska, the *Aleutian Falcon* docked at Trident Seafoods' shipyard facility in Tacoma, Washington, to begin its maintenance and repair (M&R) period in anticipation of the 2021 processing season. During M&R periods, workers were assigned to the vessel; they came aboard in the mornings and left in the late afternoons. These workers usually included the chief

engineer, port engineer, welders, and deckhands, who were all Trident employees. Additional laborers were drawn from local temporary employment agencies.

One of the worklist items scheduled to be conducted during the M&R period was to crop and renew a section of corroded steel bridge deck plating that measured 22 feet transversely and 20 inches longitudinally. The corroded section of plating ran beneath the aftmost transverse bulkhead on the port side of the house. The lower portion of this bulkhead, near where it met the deck, was also corroded and needed to be cropped and renewed. The steel would be cut out using oxy-acetylene cutting torches and electric grinders with cutting wheels. The job was considered "hot work," since these tools could produce sparks. After the corroded steel was removed, new steel plating would be fitted into the open area and the seams welded.

Beneath the bridge deck plating being removed, within the shelter deck, was a pantry, a dry stores area, and the forward section of an enclosed freezer space (also called the "walk-in refrigerator"). At the forward end of the walk-in refrigerator and inboard was a longitudinal insert about 4 feet long (hereinafter referred to as a "wooden bulkhead") that separated the refrigerator space from the pantry. This insert (which, according to the chief engineer, had been fitted sometime before 2012) was constructed of two-by-four wooden framing that had insulation between the wood and 0.5-inch plywood on either side, referred to as sandwich-style construction. Forward of the walk-in refrigerator was the dry stores area. Both areas contained rows of wooden shelving.

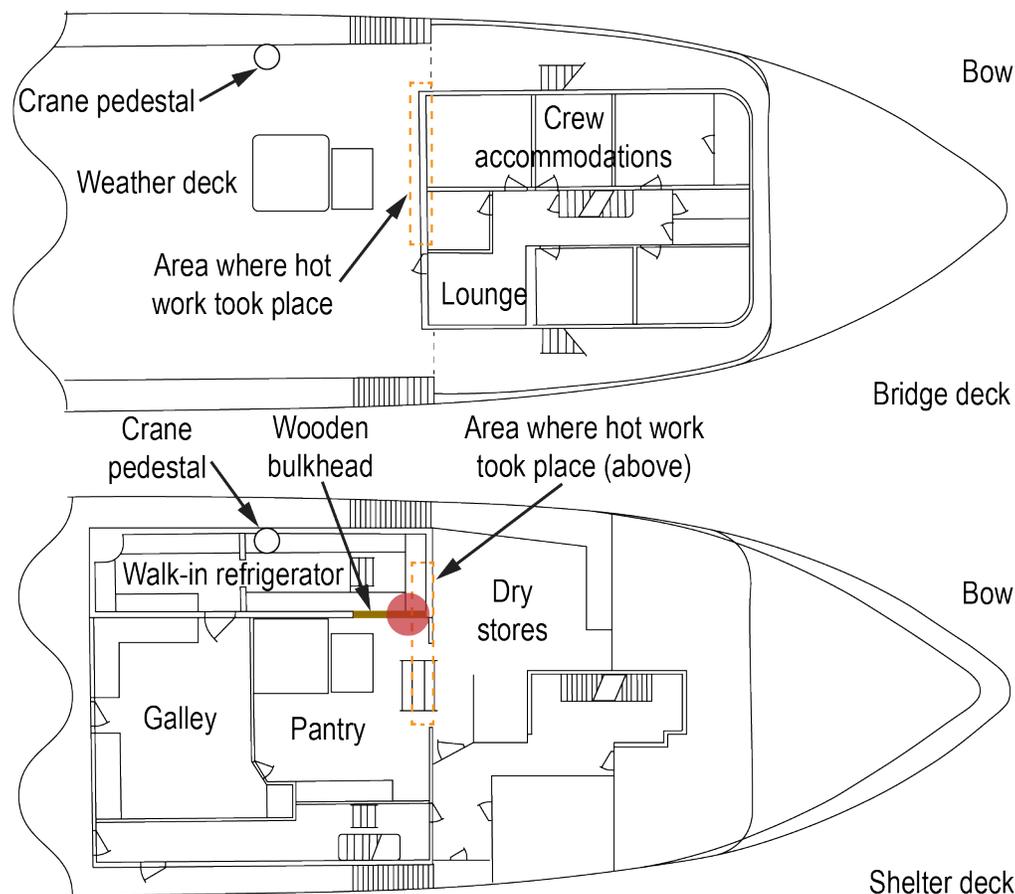


Figure 3. Bridge and shelter deck arrangements of *Aleutian Falcon*. The area of the bridge deck where the deck was being cut is highlighted with orange dashed lines. The area where the fire began on the shelter deck is indicated by a red circle. (Background Source: Trident Seafoods)

The company's vice president of safety stated that when hot work was planned around areas with foam, a marine chemist would typically come on board to "tell us the distance that we need to be able to...clear the foam out...or what we need to do to mitigate it."² On February 4, 2021, a marine chemist, accompanied by the company's port engineer, surveyed the hot work areas where the cutting and inserting would take place. The marine chemist stated that cutting through the bridge deck was not discussed; the port engineer, however, stated that he told the marine chemist that they were going to cut and insert new plating in the deck. The marine chemist issued a marine chemist certificate, which allowed workers to "grind, weld, and cut with cut off wheel to the weather deck above the walk-in refrigerator (forward) without penetrating it" and required workers to "keep hot work 12 inches away and isolated from any foam

² A *marine chemist* is a trained individual, certified by the National Fire Protection Association, who determines if a shipboard repair, alteration, construction, or shipbreaking activity can be safely undertaken.

insulation.” The certificate was signed by the port engineer. The port engineer told investigators that he did not believe they would be cutting into the walk-in refrigerator space.

On the morning of February 17, the port engineer discussed the assigned work to be completed that day on the *Aleutian Falcon* with the lead welder while ashore at the Trident office in Tacoma. At that time, about the lower 2 feet of the aftmost bulkhead and a portion of the deck plating on the starboard side had already been removed using cutoff wheels. The workers planned to use cutting torches to finish cutting the section of bridge deck plating away from the steel supporting frames below it. The port engineer typically also discussed the planned work with the facility safety manager, who was also the shipyard competent person (SCP) for the *Aleutian Falcon* at the time, but he was not certain whether he had done so that day.³

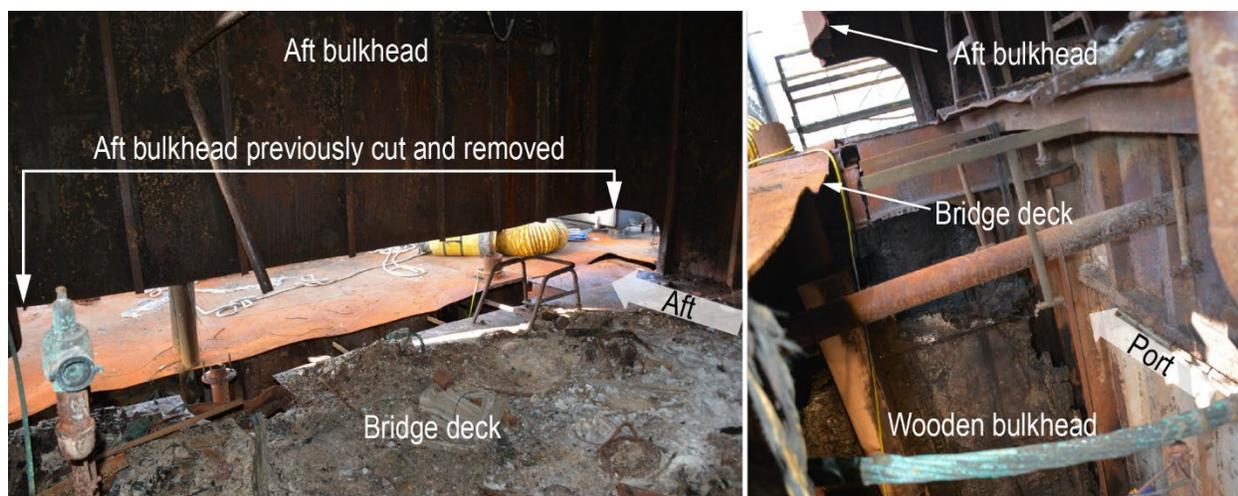


Figure 4. *Aleutian Falcon* bridge deck post-fire, depicting hot work area on the day of the casualty. (Background source: Bureau of Alcohol, Tobacco, Firearms and Explosives)

Shortly after 0600, regular workers from Trident and temporary workers boarded the vessel. The workers included the supervisory lead welder, four welders, one laborer, and four fire watches. According to the workers, before the hot work began, they removed the polyurethane foam insulation and protective coatings (paint) in the area of the planned hot work and protected all combustible materials that could not be

³ According to the Occupational Safety and Health Administration, a *shipyard competent person* “ensures safe working conditions at shipyards by determining whether a space is safe for workers to enter or perform hot work.” The port engineer, facility safety manager, and the lead welder were all trained and certified as SCPs.

removed with fire blankets and fire suppression gel.⁴ Where flammable (combustible) items could not be removed in an area where hot work would be completed, fire blankets would be used to cover the area and jammed into cracks, after which they would be wetted.

The SCP stated that he and the lead welder walked through the *Aleutian Falcon* and inspected areas where hot work was to take place, including the walk-in refrigerator and dry stores area, to ensure that the hot work areas had been adequately prepared and that firefighting equipment, such as charged fire hoses and fire extinguishers, were readily available. The port engineer stated that he believed he inspected the same areas to ensure that there was proper preparation before beginning hot work. Normally, the port engineer would also check in with the vessel's chief engineer if the vessel was crewed, but the chief engineer was temporarily assigned to another vessel and was not aboard the *Aleutian Falcon* because the processor was out of service.

About 1230, a welder in the dry stores area began cutting the deck plate with a cutting torch that freed the plating from the frames below by burning through welds. Fire watches were assigned to monitor the hot work areas, including the pantry, dry stores area, and walk-in refrigerator (described by one fire watch as very tight to work in due to the presence of an overhead evaporator, which had not been removed from the space during the preparation for hot work). During the process of freeing the plating, a small fire broke out in a piece of plywood located in the dry stores area. The workers extinguished the fire and continued hot work.

⁴ Two types of fire blankets were used on the casualty date: one made of a heavier gray material that provided protection from heat transfer and sparks; the other, a pink NOMEX material that provided protection against ignition from sparks. As a fire suppression gel, the workers used the brand "FireIce" (which they referred to as "fire and ice").



Figure 6. Pre-fire photos of the forward portion of the walk-in refrigerator (*left*) looking forward, showing overhead evaporator, wooden shelving, and step-down area, and the dry stores area (*right*), looking to port and overhead, containing draped pink fire blankets. (Source: Trident Seafoods)

After completing the torch work to free the plate, two welders on the bridge deck area began plate removal over the walk-in refrigerator area using cutting disks attached to electric grinders, cutting through the deck during the process. According to the workers, all cutting concluded about 1520. The fire watch in the walk-in refrigerator monitored the area until about 1620. At 1631, he left the vessel; he was the last of the workers to leave the area where hot work had been completed.

Trident employed the services of a security watch that made regular rounds of the facility. While the *Aleutian Falcon* was at the shipyard, the fire-detection system remained functional, alarming in the pilothouse if a fire was detected. Between 2122 and 2126, the guard walked along the pier where the *Aleutian Falcon* was moored but noticed nothing unusual.

At 2145, a motorist located across the Hylebos Waterway noticed white smoke coming from the *Aleutian Falcon*; he did not report the smoke because he believed it was the result of work being performed aboard the vessel. He kept driving but stopped further along the road at an overlook to observe the vessel, then noticing an orange glow in the area where he had earlier seen the white smoke. At 2232, he made a 911 call to report the fire.

At 2255, the Tacoma Fire Department arrived on scene. Firefighters reported there was no one at the gate when they arrived, so they were initially unable to gain access to the pier where the vessel was docked. Once they gained access to the pier, the firefighters “initiated access” to the vessel and saw fire “at the base of the pilothouse.” They first set up fire hoses to isolate the fire in the forward and midship areas where they could see flames, and an aerial ladder was supplied to “protect exposures and knock down bulk fire without boarding the ship.” Shortly after the hoses were prepared, responders determined that fire conditions “would not allow for a safe land-based shoreside fire attack,” so they transitioned to a defensive strategy, cooling the hull using fireboats.

Between 0402 and 1131 on February 18, a “shelter in place” order was issued to the local community due to the danger of smoke and toxic fumes carried by the prevailing winds. The fire was declared extinguished at 1300 on February 22.

1.3 Additional Information

1.3.1 Fire Investigation

From March 1 to 3, fire investigators from the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) examined the *Aleutian Falcon* at the request of the US Coast Guard. On July 16, the ATF issued a preliminary report; they determined that the fire was “accidental” and that the ignition source was hot slag from the hot work being performed in the walk-in refrigerator area and pantry, including the bulkheads of the spaces, which ignited combustibles such as cardboard, plywood, and polyurethane insulation. Release of the preliminary report and additional materials related to the investigation were prohibited by the ATF.



Figure 8. Forward end of *Aleutian Falcon* walk-in refrigerator after the fire. (Background source: ATF)

1.3.2 Fishing Vessel Examinations

As an uninspected fish processor, the *Aleutian Falcon* was required to be examined by the American Bureau of Shipping, a similarly qualified organization, or a surveyor of an accepted organization for compliance with the regulations in Title 46 *Code of Federal Regulations* Part 28 at least once every 2 years. The examination consisted primarily of a check of safety, navigation, and pollution-related equipment, as well as required documentation. The last examination was completed on January 10, 2019, and the vessel was issued the vessel a certificate of compliance that was valid for 2 years.

1.3.3 Hot Work Requirements

The Occupational Safety and Health Administration (OSHA) provides standards for safely conducting hot work. OSHA states that an effective fire watch should wet down the area or cover combustible material with fire-resistant blankets while maintaining a clear view of and access to areas of hot work. OSHA requires that a fire watch remain for at least 30 minutes after the completion of hot work.

The National Fire Protection Association (NFPA) provides additional codes and standards to minimize the risk of fire in a variety of situations. NFPA standards state, "Combustibles shall be relocated at least 35 feet in all direction from hot work area. If relocation is impractical, combustibles shall be shielded by a barrier of noncombustible materials or otherwise protected." Additionally, the NFPA states that when walls or partitions of combustible construction could not be removed, a fire watch should be provided on the side opposite from where work would be performed. NFPA standards prohibit hot work on a "partition, wall, ceiling, or roof that has a combustible covering or insulation or on a wall or partition of combustible sandwich-type panel construction."

Trident Seafoods' hot work policy provided additional guidance for hot work. The company's hot work policy required the SCP to conduct a safety inspection of the hot work areas (OSHA and the NFPA also required as much) before any hot work took place. The SCP was further required by the policy to "maintain safe conditions set by the marine chemist."

Additionally, the City of Tacoma required Trident Seafoods to obtain an annual hot work permit from the Tacoma Fire Department for their facility in Tacoma, and the company's hot work policy reiterated this requirement. Trident Seafoods' permit was renewed on February 9, 2021.

1.3.4 Related Casualties

In August 2016, a fire broke out on the upper deck of the passenger vessel *Tahoe Queen* while the vessel was undergoing extensive maintenance and repairs on Lake Tahoe, Nevada.⁵ The NTSB found that the probable cause of the fire was “the operating company’s poor oversight of its contractors’ adherence to hot work safety policies.”

In May 2018, while the cargo ship *Chipolbrok Moon* was moored in the Port of Houston, Texas, a fire broke out in a cargo hold after the crew had completed hot work in that space.⁶ The NTSB found that the probable cause of the fire was “the crew’s lack of adherence to the company’s safety management system and the marine chemist’s instructions pertaining to hot work precautions.” In its report, the NTSB highlighted the importance of “evaluat[ing] work areas for fire hazards to ensure that adequate protection is in place.”

In December 2018, a fire started following hot work on board the fishing vessel *Jeanette* while pierside in Pago, Pago, American Samoa.⁷ The NTSB found that the probable cause was “inadequate crew training and oversight by the company to ensure safe hot work practices were followed on board the vessel.” Additionally, the NTSB stressed that “before conducting hot work, it is critical to evaluate work areas for fire hazards to ensure that adequate protection is in place.”

2. Analysis

At the end of the fishing season in August 2020, the *Aleutian Falcon* docked at the Trident Seafoods facility to complete maintenance and repairs. No one remained (or lived) on board while the vessel was docked, but workers came on board during the day to perform tasks as assigned.

On February 17, 2021, workers planned to continue ongoing hot work by removing corroded steel deck plating located on the bridge deck above the pantry, dry stores area, and walk-in refrigerator. The plating was located beneath bulkhead plating above that had already been cropped out. Because the work was in an area that adjoined foam insulation below, a marine chemist had previously been brought on board to examine the areas involved. The port engineer, SCP, and lead welder

⁵ *Fire aboard Passenger Vessel Tahoe Queen*, Marine Accident Brief [NTSB/MAB-17/24](#). Washington, DC: NTSB.

⁶ *Fire board Cargo Ship Chipolbrok Moon*, Marine Accident Brief [NTSB/MAB-19/09](#). Washington, DC: NTSB.

⁷ *Fire and Sinking of Fishing Vessel Jeanette*, Marine Accident Brief [NTSB/MAB-19/32](#). Washington, DC: NTSB.

(supervisory personnel) understood that replacing the wasted deck plating meant that that the old steel had to be both cut out and new steel welded in place. Therefore, they should have been aware that the spaces immediately beneath the deck would be subject to flames, heat, and sparks from torchwork, grinding, and then welding. However, it is unclear whether the port engineer explained to the marine chemist that they would be cutting through the bridge deck plating. The marine chemist issued a certificate, signed by the port engineer, that stipulated that work must be completed “without penetrating” the bridge deck, indicating he either was not aware or clearly informed of the full scope of the planned hot work, or he wrote the stipulation in error. It is also unclear whether the port engineer or SCP noticed or whether the lead welder or workers were informed of the restrictions listed in the certificate.

The SCP was required by OSHA and the NFPA (as well as the company’s hot work policy) to complete a safety inspection of the area where hot work would be completed to ensure the space was adequately prepared. The SCP stated that he inspected the hot work area with the lead welder, and the port engineer believed he had inspected the spaces as well. However, if either had performed a thorough inspection, they would have been aware that the planned work would involve cutting through the deck directly above the wooden bulkhead and foam insulation separating the walk-in refrigerator and pantry and then about 4 feet into the walk-in refrigerator itself, which would therefore violate the conditions of the marine chemist certificate. If the supervisory personnel were confused by the restrictions listed on the certificate (since the restrictions prevented the exact work they planned to complete), they could have requested clarification from the marine chemist, but none of them did so.

The marine chemist certificate required the removal of all foam insulation within 12 inches of the area of planned hot work—likely as a precaution in the event the foam was combustible and could create toxic fumes when exposed to heat from hot work nearby. The workers stated that they removed the foam insulation in the area of hot work, including foam in the walk-in refrigerator, indicating that (1) they believed the hot work would involve the walk-in refrigerator, and (2) the workers were either aware of some of the requirements in the certificate or had been instructed to remove the foam by a supervisor. However, the workers did not remove the foam-filled wooden bulkhead, which was combustible; instead, they covered the area in fire blankets and stationed a fire watch in the walk-in refrigerator. The wooden bulkhead was of sandwich-style construction, and based on post-fire photographs, the bulkhead reached to about the transverse steel framing members supporting the bridge deck and was not removed beneath the deck. This type of construction would have made it almost impossible to adequately protect the bulkhead without removing it completely. Additionally, according to NFPA standards, hot work should not have been performed on this bulkhead because of its sandwich-style construction. While the lead welder should have

been aware of the presence of the wooden bulkhead, there is no indication he communicated as much to the SCP or port engineer.

Based on the damage to the vessel's walk-in refrigerator and dry stores area, as well as the ATF's preliminary findings, the fire's most likely area of origin was near the longitudinal wooden bulkhead located forward in the walk-in refrigerator space, adjacent to the pantry, and aft of the dry stores area, located directly below the area where hot work had been completed for the day. The hot work would have produced sparks and slag that likely traveled from the deck above (overhead) into the wooden bulkhead separating the walk-in refrigerator and pantry, igniting the combustible materials in the area, as well as the bulkhead, and allowing for a smoldering fire to become established. Because of the fire's location, it would have likely gone unnoticed by a fire watch before they departed the vessel about 1 hour after work was completed for the day about 1631. Once the fire developed further, it was likely detected by the vessel's fire-detection system hours later; however, the system would have alarmed only in the pilothouse, an area that was unmanned at the time, so no one was alerted. The shipyard had a security guard who walked by the ship at 2122, but he did not notice anything unusual. Because no one was aware of the fire, it continued to grow and spread, until it became large enough for a passerby to report it about an hour later. The delay in recognition allowed the fire to expand to a point that responding firefighters could not enter the vessel, and the *Aleutian Falcon* was extensively damaged above the waterline.

3. Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the fish processor *Aleutian Falcon* was the company's supervisory personnel inadequately planning for hot work, as well as shoreside workers' inadequately protecting hot work areas, allowing slag from hot work to ignite combustible material near an insulated wooden bulkhead of a walk-in refrigerator that had not been removed or sufficiently protected. Contributing to the casualty was the ineffective communication between the supervisory personnel, marine chemist, and workers.

3.2 Lessons Learned: Preparing for Hot Work

It is critical for supervisory personnel to evaluate hot work areas for fire hazards to ensure that affected spaces are completely understood, prepared, and protected for

planned hot work in accordance with regulatory guidelines, company policies, and marine chemist certificates. Adherence to proper policies and procedures is vital to completing a safe hot work operation. Additionally, crewmembers and personnel involved in hot work should be able to identify hazards and take action to remove or mitigate potential risks to the vessel.

Vessel	<i>Aleutian Falcon</i>
Type	Fishing (fish processor)
Flag	United States
Port of registry	Seattle, Washington
Year built	1981
Official number (US)	642161
IMO number	8016330
Classification society	American Bureau of Shipping (loadline only)
Length (overall)	233.0 ft (71.0 m)
Beam	39.4 ft (12.0 m)
Draft (casualty)	11.0 ft (3.4 m)
Tonnage	783 GRT
Engine power; manufacturer	2 x 3,000 hp (2,237 kW); GE 7FDL12 diesel engines

NTSB investigators worked closely with our counterparts from **Coast Guard Sector Puget Sound** throughout this investigation.

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For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID DCA21FM016. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

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